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ESSENTIALS OF APIARY PRACTICE AND MANAGEMENT

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Beekeeping has to do with enduring colonies of short-lived insects. The colony, not the individual is the unit. Bees cannot be harnessed or trained like animals. Only inherited characteristics may be altered slightly by breeding. Their labor which is useful to man is performed primarily for the benefit of the colony; man appropriates the surplus. Apiary practice consists in so controlling the economy of the hive as to increase this surplus to a maximum. Altho bees are not harnessed or trained, the key word to successful practice is "Control." It is well established in beekeeping literature that strong colonies during the whole period of the honey flow are of the utmost importance. In recent years the willingness to work of these strong colonies has been equally stressed. Successful apiary practice secures the maximum surplus production of honey by controlling the condition of every colony, so that it has a maximum surplus population of vigorous willing workers during the whole period of the honey flow.

The year in the apiary is divided into Active and Inactive seasons. The former may be subdivided into preparation time and surplus-

storing time. One shades off into the other according to seasonal and colony conditions. The length of the inactive season depends on a number of conditions more or less under control. It is the aim of apiary practice to prolong the inactive season until activity will be of value, and especially to maintain rest at times when activity would be an actual menace to the well-being of the colony. When the time for profitable activity arrives it is the aim of apiary practice to encourage population increase to the utmost during the preparation time, then to maintain working morale and discourage the tendency to divide up the working force by swarming. If at the end of the active season the colony is in the best condition for the period of rest the beekeeper has done his full duty by his charge. The care of the surplus stores appropriated by the beekeeper is another matter.

The desirable characteristics sought in breeding honey bees are these: vigor, especially for honey gathering, but including resistance to cold or disease, quietness of nerves for good wintering and the comfort of the beekeeper in manipulations, contentment under conditions which tend to cause swarming, and length of life of the individual. The obstacle in the way of exact selection is the difficulty of controlling mating. For all practical purposes this is largely overcome by the use of good combs bringing drone production under control, and by mating the queens in fairly large apiaries where selection is constantly practised and best colonies allowed to produce drones freely.

The control of the colony in the Inactive Season is commonly called "wintering," and is discussed and analyzed copiously in all bee literature. The essential factors are three: the colony, the stores, and the shelter. The colony should consist of an ample number of individuals having a maximum supply of vitality, and having quiet nerves. The stores should consist of an ample supply of food containing a minimum of matter which the bee is unable to digest and assimilate. Since natural stores are very variable in this respect, the control of food quality is of the utmost importance. The writer has long contended that for a Northern winter every colony should be fed largely on sugar syrup after natural storing has ceased, and this point is coming to be generally conceded. He would venture now to go a step further and ask if the same procedure might not reduce colony activity when it is desirable to have activity suspended in warmer climates. By "shelter" is meant both the hive and its insulation from cold and protection from winds. The value of both packing and wind screens is undisputed; but the method of disposal of cluster moisture may be discussed. As a safe arrangement for a long cold winter the writer has found upward absorp-

tion the best method. This is provided by placing several layers of newspaper directly over the cluster and separated from it by a porous cloth to keep the bees from gnawing the paper. Upon the paper is a heavy layer of packing material kept dry by ventilation in the roof of the outer case. Any cluster moisture which may condense on the paper passes freely upward by absorption, but heated air does not readily escape as it does in ordinary systems of upward ventilation. This gives upward absorption insuring dryness with a minimum of upward ventilation and corresponding loss of heat.

The preparation part of the Active Season is devoted to rearing an abundant supply of workers. The essentials of management here are to insure a surplus of food, both honey and pollen, protection from cold as in winter, and plenty of worker comb space for brood. A queen moves upward into laying space more readily than downward, yet she hesitates to pass over sealed honey to this space. Using this principle we find it pays to winter in a Langstroth broodchamber with shallow super for stores. Early in the preparation period a second Langstroth broodchamber of dark worker combs is placed between the brood and the stores. This is only given to colonies which are ready for it and the queen occupies it at once, spreading out great sheets of eggs which the winter packing enables the colony to protect. Dark combs with unstretched cells acceptable to the queen especially next the top bar are preferred for breeding purposes. It is notable that even for storing honey, bees prefer dark combs, and much more so for brood. Every such preference should be recognized where possible. At the end of this period the brood chamber is reduced to one story again.

During the surplus storing period the beekeeper's duty is to prevent or control the swarming impulse, and failing that to prevent swarming, without allowing the working morale to be lowered. This calls for rather close supervision of colony conditions by someone with expert judgment. Entrance diagnosis is dangerous as it only reports lowered morale instead of forecasting it. One must watch internal conditions to prevent loss of working vigor. If absolute uniformity of stock and rate of development could be secured by breeding, treatment suitable for a whole apiary could be decided by examining a few hives. But not many apiaries have been brought to that state of perfection. In most apiaries it is profitable to see internal broodchamber and super conditions at regular intervals of time. The appearance of a colony in prime working condition is well defined:—Plenty of eggs and brood in all stages and no queen-cells, plenty of bees of all ages and no loafing, room for the queen to continue brood-nest development, and ample

super space for storage of honey in combs next above the broodchamber.

The swarming impulse usually appears when the queen begins to lag or the hive becomes uncomfortable through crowding or overheating. There is a difference which the queen record will show between queen resting and queen failing. The failing queen should be replaced at once with a young one. The resting queen, if her rest causes swarming impulse may be caged or placed in a nucleus for a time and the colony given a laying queen after it has had time to build cells and cap its brood. Except for special breeding purposes a queen which has had a journey through the mails should never be used; her remaining vitality is of too uncertain quantity. To allow the least slackening of storing zeal in any colony through crowding or any other preventable cause not only produces a temporary loss of surplus but lowers the working morale for the rest of the season. Contrary to prevalent teaching, the writer is firmly convinced that it is profitable for the commerical beekeeper to thoroughly examine every colony at least once in ten days during the storing period and give only such treatment as he finds each one needs, in preference to giving more radical treatment with the hope that it will produce a high state of colony morale during the remainder of the season. A comparison of results obtained from over five hundred colonies with the crops of larger beekeepers in similar localities bears out this conclusion.

With healthy colonies brought up to the storing season in the best of condition, maximum crops of honey are only secured by careful attention to the details of keeping up the highest morale or working zeal of every colony. As the key word of apiary practice is "Control," the key word of colony morale is "Contentment." This is maintained by reducing interference with normal colony conditions to a minimun, yet making that minimum of interference in the case of each colony of the exact nature and at the precise time that will do the most good.

The writer does not claim much if any originality in the ideas presented in this paper. No attempt has been made to exhaustively tabulate essentials of apiary practice. The purpose is only to call attention to some of the most important ones which may not be receiving as much attention in beekeeping literature as their value warrants.

THE CORRELATION BETWEEN SOME PHYSICAL CHARACTERS OF THE BEE AND ITS HONEY-STORING ABILITIES[1]

By J. H. MERRILL, *Apiarist, Kansas State Agricultural Experiment Station*

It has long been known that some colonies in a beeyard exceed others in the amount of honey they store. As a remedy for this condition, it has been urged to have all the colonies strong before the honey flow begins and to have them as nearly the same strength as possible. Yet, even when this advice has been followed, bees of the same race, raised from queens of the same age and strain, differ in the amount of honey that they store. In an attempt to learn why these facts exist, the following experiment is being conducted at this station.

During the summer of 1920, four colonies of bees, numbered 5, 6, 7, and 8 respectively, were selected to be used for this experiment. In 1921, the number of colonies used was increased to six and numbered 1, 2, 3, 4, 5, and 6. During both years the colonies selected were nearly equal in strength, the queens used were of the same age, and raised by the same breeder. Throughout both summers the same manipulations were made with each colony.

At the beginning of the summer the exact number of bees, the amount of honey in each hive, and the amount of brood were determined by a system of weighing. In July, 1921, a mid-season weighing was made before the main honey flow ended. In the fall of the year another weighing was made to ascertain the total amount of honey that had been stored in each colony during the season.

Collections were made daily of ten bees returning to each hive, and when possible a second collection was made during the day. These bees were then taken to the laboratory where the tongue (glossa) of each was measured, the amount of nectar in its stomach was weighed to determine its carrying capacity, and then the weight of the bee, together with its empty honey stomach and tongue was determined. During 1920, bees filled with nectar returning from the field were collected, and the nectar was weighed. Since nectar from different plants varies in specific gravity, it was decided in 1921 to allow the bees to digest the nectar which they had brought in, and then feed them with a sweetened solution of standard strength. During the summer of 1920, 2880 bees were examined and the results recorded. It was found that

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[1]Contribution No. 74, from the Entomological Laboratory, Kansas State Agricultural College. This paper embodies some of the results obtained in the prosecution of project No. 126 of the Agricultural Experiment Station.

there was a distinct correlation between certain physical characters of the bee and the amount of honey stored. This is shown in the following table.

TABLE I.—COMPARISON OF SOME PHYSICAL CHARACTERS AND THE TOTAL AMOUNT OF HONEY STORED DURING 1920

Hive number	5	6	7	8
No. of bees in spring	4th 12,500	2d 19,375	1st 20,000	3d 18,750
Length of tongue	4th	2d	1st	3d
Weight of bee	3d	2d	1st	4th
Carrying capacity	4th	1st	2d	3d
Total honey stored in pounds	3d 61⅜	1st 116⅝	2d 74½	4th 53¾

Some of the significant facts brought out by this table are: First, the bees which have the longest tongues, the largest bodies, and the greatest carrying capacity are also the ones which form the strongest colonies in the spring. This fact will be emphasized when the results of 1921 are examined. It will be noticed that the colonies possessing the longest tongues, greatest bodies and largest carrying capacity exceed in the total amount of honey stored.

Colony No. 6, which ranked second in number of bees in the spring, second in length of tongue, and second in weight of bee, ranked first in the total amount of honey stored. Colony No. 7 ranked first, although it was approximately equal to colony No. 6 in the number of bees in the spring; was first in length of tongue, first in weight of bee, but was second in its carrying capacity and was second in the total amount of honey stored.

The following table shows the same results for 1921.

TABLE II.—COMPARISON OF THE CARRYING CAPACITY AND STORING ABILITY

Hive number	1	2	3	4	5	6
Total honey produced in pounds	4th 56⅝	6th 16½	1st 119½	2d 82⅔	3d 68⅜	5th 43
Carrying capacity in mg.	4th 19.59	5th 18.67	1st 21.63	2d 20.05	3d 19.89	6th 18.64

The above table shows a comparison of the total amount of honey stored in each hive and the average carrying capacity of the bees in those hives. The relative rank is indicated by the figures placed above the results. The colonies whose bees had the largest individual carrying capacity are the ones which stored the greatest amount of honey, and for the four highest there appears to be a direct correlation between the carrying capacity and the total amount of honey stored

during the entire season. The results of the 1921 season confirm those obtained in 1920, since the colonies which ranked first, second, third and fourth in carrying capacity also ranked first, second, third and fourth in the amount of honey produced. In 1920, the colonies that ranked first and second in the individual carrying capacity, also ranked first and second in the total amount of honey stored.

As the season of 1921 was the second during which this experiment has been conducted, naturally more data were collected than during the first year. The following table summarizes some of the most striking results obtained during the second year of this work.

TABLE III.—COMPARISON OF SOME PHYSICAL CHARACTERS AND AMOUNT OF HONEY STORED DURING 1921

Hive number	1	2	3	4	5	6
No. bees in hive June 15	5th 23,740	3d 35,625	1st 42,500	4th 25,000	2d 40,000	6th 17,500
Honey stored between June 15 & July 15, in pounds	3d 62½	5th 29⅛	1st 85⅜	4th 55⅜	2d 79	6th 24⅞
Average length of tongue in mm.	6th 3.57	3d 3.62	1st 3.86	4th 3.61	2d 3.84	5th 3.59
Average weight of bee in mg.	5th 82.1	3d 86.1	1st 93.6	4th 84.6	2d 86.5	6th 70.6
Carrying capacity in mg.	4th 19.59	5th 18.67	1st 21.63	2d 20.05	3d 19.89	6th 18.64
Total honey produced in pounds	4th 56⅜	6th 16½	1st 119¼	2d 82¼	3d 68⅜	5th 43

These hives were kept on platform scales throughout the season, and a record was made of the daily changes in weight, which indicated whether or not nectar was being brought into the hives. These records show that the main honey flow stopped on July 28, or 13 days after the mid-season weighing was made. Some very interesting facts were brought out by a study of the data, comparing the length of tongue, the weight of the bee, the number of bees which were in the hive on June 15, and the amount of honey stored during the heaviest part of the honey flow. Hive No. 3 was first in all of these respects; hive No. 5 was second, and hive No. 4 was fourth. Hive No. 2, which was third in number of bees on June 15th and third in length of tongue and the weight of the individual bee, drops to fifth place in its carrying capacity and also to fifth place in amount of honey stored between June 15 and July 15, and was sixth in rank in the total amount of honey produced for the season. Colony No. 2 and colony No. 6 were practically equal in carrying capacity and ranked sixth and fifth respectively in the total amount of honey produced. Colony No. 1, which was fifth in the number of bees, sixth in the length of the tongue, and fifth

in average weight, rose to fourth in carrying capacity, and stored the third largest amount of honey between June 15 and July 15, but was fourth in the total honey produced, which rank corresponded with its carrying capacity. Colony No. 3 exceeded all others in all of the factors here considered, and stored by far the largest amount of honey during the season. Colony No. 4 was fourth in the number of bees, fourth in the amount of honey stored between June 15 and July 15, and fourth in the length of tongue, fourth in the weight of the bee, but rose to second rank in carrying capacity and total honey produced. Colony No. 5 was second in number of bees, second in honey stored between June 15 and July 15, second in length of tongue, almost equalling colony No. 3, which ranked first in this respect; was second in the weight of the bee, but had a slightly smaller carrying capacity than colony No. 4 which ranked second in carrying capacity and total honey produced, and colony No. 5 ranked third in both of these respects. Colony No. 6 ranked sixth in every feature, except in the length of tongue and total honey produced. Its tongue length and carrying capacity were very nearly equal to that of colony No. 2, which ranked fifth in total honey produced.

These results seemed to indicate that the bees which have the longest tongues, largest bodies and greatest carrying capacities exceed, in the total amount of honey stored, those possessing these factors in a lesser degree. While there seems to be a direct relation between the length of tongue, the size of the bee when the carrying capacity is either equal or about equal, and the total amount of honey stored, yet a study of colony No. 1 would indicate that if it were deficient in the size of tongue and the size of bee, this disadvantage would be offset by the advantage of a larger carrying capacity, because, as previously mentioned, colony No. 1 ranked sixth in the length of tongue and fifth in size of bee, but in its carrying capacity it very nearly equalled colony No. 5 which ranked third in carrying capacity, and on July 15 colony No. 1 ranked third in the amount of honey stored, and at the end of the season ranked fourth in total honey produced. This is again shown in a study of colony No. 4 which ranked fourth in length of tongue and weight of bee, but second in carrying capacity and total amount of honey stored.

During both 1920 and 1921, those colonies whose bees possessed the longest tongues and had the greatest size or carrying capacity, were also strongest in the number of bees. This may be due to the fact that the length of the bee's life depends upon how rapidly its energy is expended. If the bees possessing the longest tongues, the largest size, and the greatest carrying capacities expend less energy to bring in

nectar, this may account for the fact that the bees in these colonies have longer lives and consequently are found in greater numbers.

In 1921, over 3000 bees were examined to determine the length of tongue, the individual carrying capacity, and the size of each bee. The data secured was arranged in frequency distributions and the coefficient of variability was determined from these distributions. This represented the probable variability of the group expressed on the percentage basis. The coefficient of variability in the size of the carrying capacity was larger than either of the other two characters. Consequently, in order to determine the number of individuals necessary to be examined to arrive at a definite conclusion, these figures will be based on the coefficient of variability for the carrying capacity. If ten per cent is used as the difference to be measured, then the number of individuals required would be 32. In order to further safeguard these measurements, it seems advisable to examine 40 bees from each colony, as it appears that this number would be sufficient to be fairly representative and to give data accurately sufficient to form a definite conclusion.

SUMMARY

A study of the data obtained in this experiment both in 1920 and 1921 indicates, first that there is a distinct correlation between the length of tongue, carrying capacity of the bee, and the amount of honey stored during the season; Second, that there is a distinct relation between the number of bees found in the colony in the spring and the size of the above named physical characters. Third, it is very strongly indicated that while it would be distinctly advantageous to a bee to excel in all three of its physical characters, yet if it is deficient in any of these characters, the disadvantage may be overcome if it possesses one of the other characters to a greater degree. Since the probable error for the coefficient of variability of each of these physical characters has been computed, it will be necessary to examine 40 bees from any colony in order to determine which colony of bees in a beeyard should be the best producer. As this examination can be made early in the spring, it will enable queen breeders to save one year's time in selecting the colony which they are going to choose for the best producing quality.

TIME AND LABOR FACTORS INVOLVED IN GATHERING POLLEN AND NECTAR

By WALLACE PARK, *Ass't Chief in Apiculture, Iowa Experiment Station*

TIME FACTORS

Individual bees were marked and records kept of the time of departure and return of each marked bee. Observations began early each morning and continued without interruption until the bees ceased

flying at night. During most of the time there were two observers, so that the chances for a marked bee to pass unnoticed were reduced to a minimum. Only full strength colonies were used in securing data.

Nectar Gathering

Since honeyflow and weather conditions have such a direct influence upon the gathering of nectar, the time records secured under any given set of conditions are not likely to be duplicated except under similar conditions. During the period of observation in 1920, average colonies stored about five pounds per day from white sweet clover, *Melilotus alba*, while in 1921, average colonies gained only a little over one pound per day from the same source. Weather conditions were highly favorable for honey production in the former instance but were only fair in the latter. Summarizing, it may be said that one set of data was secured under very favorable conditions, whereas, the other was obtained under conditions which were from mediocre to poor. The data for field trips, hive stays and round trips have been plotted as frequency curves in which the records obtained under favorable and unfavorable conditions are compared.

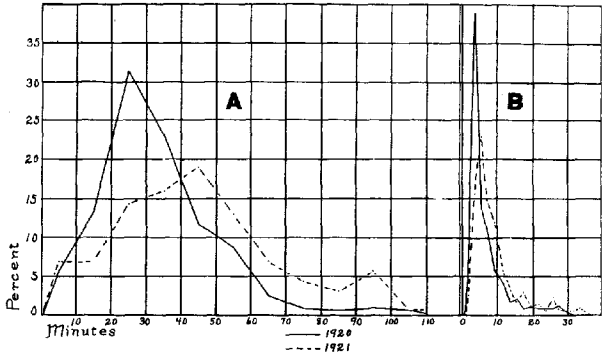

Fig. 3. Showing the frequency distribution of time records made by nectar carriers under *favorable* and *unfavorable* honeyflow conditions. A, Field trip records. B, Hive stay records.

Of the records obtained for field trips made by nectar carriers in 1920, 31 percent fell within the 21-30 minute class, as shown in Fig. 3, A. About 68 percent fell between 10 and 40 minutes, and 95 percent occupied less than 1 hour. The mean time was about 34 minutes but the modal or most frequent interval spent in the field was 26.8 minutes.

[1]Modal values have been determined by use of W. I. King's formula given in his "Elements of Statistical Method," p. 124.

In 1921, only 19 percent of the field trip records fell within the 41-50 minute class in which the peak of the curve appeared. About 48 percent fell between 30 and 60 minutes, and 76 percent were completed within 1 hour. The mean time for field trips was 49 minutes but the modal interval was 45 minutes.

As shown in Fig. 3, B, the 3 and 4 minute records of hive stays by nectar carriers comprised nearly 40 percent of the total number recorded in 1920. Over 75 percent were completed within 10 minutes. The average time for all hive stays was 11.6 minutes but the figure is not very significant owing to the markedly skew form of the curve. The modal or most frequent interval spent in the hive between field trips was 3.9 minutes.

In 1921, the records of hive stays were more widely scattered than in the preceding year. The peak of the curve fell within the 5-6 minute period which included only about 23 percent of the records; but nearly 68 percent were completed in 10 minutes or less. The mean time was about 16 minutes while the modal interval was 5.5 minutes.

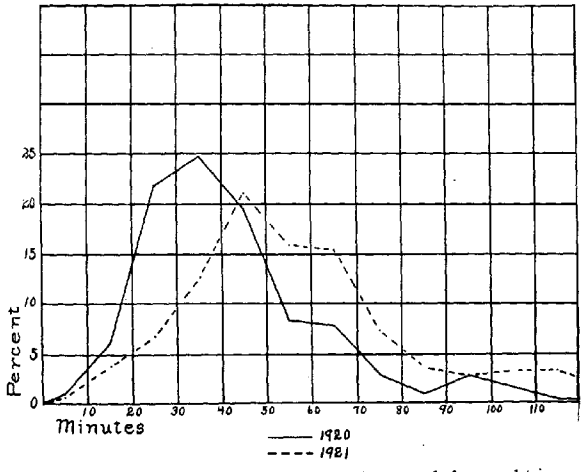

Fig. 4. Showing the frequency distribution of time records for round trips made by nectar carriers under *favorable* and *unfavorable* honeyflow conditions.

Nearly 25 percent of the round trips recorded for 1920 fell within the 31-40 minute period as shown in Fig. 4. Just 66 percent occupied between 20 and 50 minutes each, and 90 percent were completed in less than 1¼ hours. The mean time was 45 minutes, whereas, the modal or most frequent time was only 35 minutes.

In 1921, about 21 percent of the recorded round trips belonged in the 41-50 minute class. Scarcely 50 percent fell between 20 and 50 minutes and only 80 percent were completed in less than 1¼ hours. The mean time was 63 minutes but the modal time was 46 minutes.

The maximum number of trips recorded in one day for a nectar carrier was 24 in 1920 and 17 in 1921. The average number of trips per day was found to be 13½ in 1920 while in 1921 the average was only 7 per day. If the mean time for round trips for each year be multiplied by the average number of trips per day for the same year, we arrive at an approximation to the average time per day spent in nectar gathering. This gives about 8½ hours for field work in 1920 and about 7½ hours for 1921.

Pollen Gathering

Time records for field trips, hive stays and round trips by bees gathering pollen from corn were secured in 1920 and again in 1921. The weather conditions in both instances were favorable enough for the production of pollen by the plant and for field work on the part of the bees. But in 1920, the data were taken at times when there was an abundance of corn in bloom, whereas, in 1921, the main period of bloom had passed before the records were obtained. We have, then, as for nectar carriers, one set of data secured under favorable conditions, and the other under less favorable conditions. The records for the two seasons have been plotted against each other in the form of frequency curves which appear in Fig. 5, A. B and C. In every case the curve is a decided skew, so for purposes of comparison, the *mode* is used in preference to the *mean*.

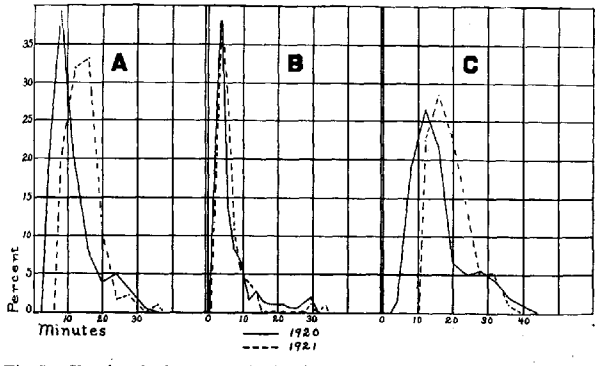

Fig. 5. Showing the frequency distribution of time records made by pollen bearers when gathering pollen from corn under *favorable* and *unfavorable* conditions. A, Field trip records. B, Hive stay records. C, Round trip records.

Field trips by pollen bearers were found to be considerably shorter as a rule than those made by nectar carriers. As shown in Fig. 5, A, almost 40 percent of the field trip records for 1920 fell within the 6-10 minute class, and 97.5 percent were completed in 30 minutes or less. None of the 1921 records for field trips fell within the 2-6 minute class, and only 20 percent fell within the 6-10 minute class, yet 99 percent were accomplished in 30 minutes or less. The modal time, however, was 15.5 minutes as against only 8.6 minutes in 1920.

The curves for hive stays appear in Fig. 5, B, and are very similar for the two seasons. The peaks both fell within the 2-4 minute class. In 1920, this class received 38 percent of the records as against 36 percent in 1921, but the percentage of hive stays that occupied 15 minutes or less was 98 in 1921 as against 88 in 1920. The most frequent interval spent in the hive between trips was 3.4 minutes in 1920 and 3.7 minutes in 1921.

In Fig. 5, C, we have the curves for round trips. The modal interval for the 1920 records was 12.6 minutes but was 16.5 minutes in 1921. The percentages of records falling within the modal class were nearly the same in both cases. In fact, the two curves are much alike as to area and shape, but the one for 1921 stands about 4 minutes farther to the right than does the other. This indicates in a general way that the bees that gathered corn pollen during the period of observation in 1921 consumed about 4 minutes per trip more than did those in 1920 when corn pollen was more plentiful.

The maximum number of trips recorded in one day for a bee gathering pollen from corn was 20 in 1920 but only 11 in 1921 while the averages were about 8 and 5½, respectively. As a rule, corn pollen was not available in the afternoon so these figures represented only about half a day in actual working time.

Labor Factors

Before the nectar carrying capacity of the honeybee could be found, it was necessary to determine the minimum flying weight. This determination was made by three different methods, all of which gave approximately 82 mg. as the average minimum flying weight for Italian bees. The load carried was determined by deducting this factor from the gross weight of the loaded bee. The maximum nectar carrying capacity was found to be approximately 70 mg. or about 85 percent of the weight of the bee itself. Average loads were found to weigh 40 mg. or about 50 percent of the weight of the bee.

The weight of pollen loads carried by bees apparently differs according to the source, ranging from 12 and 14 mg. for elm and corn, respectively,

up to 25 mg. for apple and 29 mg. for hard maple. Thus a maximum load of pollen was found to be about one-third of the weight of the bee and less than half that of a maximum load of nectar. It appears that there must be a great difference in the specific gravity of various pollens, for the loads carried from corn appeared fully as large as those from apple or hard maple, but they weighed only half as much.

STUDIES OF THE TEMPERATURE OF INDIVIDUAL INSECTS, WITH SPECIAL REFERENCE TO THE HONEY BEE

By GREGOR B. PIRSCH

(Withdrawn for publication elsewhere.)

THE COST OF POOR QUEENS

By F. B. PADDOCK, *Ames, Iowa*

In a previous paper[1] attention was called to the irregularity of colony production. Records were made in a yard in which colonies having queens from the same source produced from almost no surplus honey to a good crop. It was further pointed out that too large a proportion of colonies produced under a profitable or average crop. The estimated cost of these low producing queens was placed at $18 each, the market value of the honey they failed to produce under the yard average. It was suggested that perhaps queens were being sold which came from a low producing type. Individual record of performance was intimated as a relief measure for the present unsatisfactory honey yields.

The records made during the season 1920 were continued during the present season, 1921. The summary of the records for the two seasons is given in Table 1.

TABLE I.—QUEEN RECORDS FOR 1920 AND 1921.

Source	Date	Purchased	Lost	Replaced	1920 Season	1921 Season	1920 Crop	1921 Crop	Cost
I	Apr. 25/20	40	9	17-6	14	5	84	112	$3.50
II	Apr. 30/20	20	6	3	11	5	100	100	2.25
III	Aug. 11/20	6	3	0	3	3		120	2.50
IV	Aug. 14/20	12	5	4	7	3		60	5.00
V	Sept. 27/10	12	10	0	2	2		80	7.50
VI	Apr. 25/21	2	-	1		1		80	

[1]Jl. Ec. Ent. XIV. 1, pp. 101-105.

From the data given in this table it is possible to make certain deductions:

1. There is too much loss in queen introduction.
2. There is too much replacement necessary.
3. There is too low proportion of good replacement.
4. The cost of good replacements is very high.
5. Late fall requeening proved very unsatisfactory.

There are also questions coming from the experience of the two seasons:

1. How soon should a queen be replaced?
2. How can replacement best be made?
3. Are we getting low producing queens?

Of the queens from source I almost 25% were lost in introduction. These were introduced by the cage method, considered as nearly safe as any method which can be recommended to the average beekeeper. From source II 30% of the queens were lost when the cage method of introducing was used. In the two cases the introduction was made early in the spring and in some instances into 3-frame nuclei. However dandelion was in full bloom and requeening at this date is generally considered safe. The queens of sources III and IV were introduced during the first half of August, the period usually considered ideal for fall requeening in this locality. The introducing was done by the cage method into full colonies. The only possible cause for the high loss at this time was the nectar flow; honey was coming in but not in great quantities. In the case of source V the requeening was undoubtedly attempted too late in the season. At this time the nectar flow was over and early preparations for winter were under way. The queens of source VI were introduced early by the cage method, and into 3-frame nuclei. A moderate amount of feed was given to these nuclei which may have so changed conditions that the queens were accepted.

At the close of the 1920 producing season 17 of the 31 queens from source I were found to have given such poor results that they were killed. Eleven were replaced and the small amount of bees in the 6 remaining colonies were doubled with other colonies. Not only was a very large number of replacements necessary but what should have been 6 colonies disappeared from record. By the end of the 1921 season 9 of the 14 remaining queens gave such poor results that they were replaced. Of the queens from source II only 3 were found unsatisfactory during their first season and were replaced. However, during the second year 6 of those saved were replaced because the results of their colonies were unsatisfactory.

Then it can be said that some of the queens which give good results during their first season may be wholly unsatisfactory during their second year. Of the queens from source I there was a much higher proportion of replacement during the first season (almost six times) than in source II, while during the second season there was 64% replace ment in source I and 54% in source II. During the first season the production of source I queens was somewhat lower than source II queens, but during the second season the reverse was the case.

The queens of sources III, IV and V were used to replace those found unsatisfactory in sources I and II.

Of these fall introduced queens (III, IV, and V) there was much less replacement in general. The queens of source IV proved quite unsatisfactory as is evidenced by the decidedly poor production. The source VI queens were hardly satisfactory and 1 of the 2 was replaced. During the first season of production there was a 33% total replacement of the queens from these three sources. During the second season after replacement one year there was an average of 59% replacement of source I and II queens. The replacement of queens is therefore not nearly as assuring as one would wish since it has been found necessary to replace among the queens used for replacing unsatisfactory colonies.

The queens of each source were of the commercial quality known as "Untested." The definition for this grade of queen is reasonably well understood. The customary price received for such queens was $1.25 each or $15 per dozen. On this basis the queens worth retaining after loss of introduction in source I represented a cost of $2.50 each, source IV cost $5.00 each and source V cost $7.50. This cost is entirely too high and too variable.

The very poor results obtained in the introduction of queens in source V would seem to point clearly to the fact that requeening so late in the fall is wholly undesirable. At this time there is seldom any honey flow and the early preparations for winter are under way by the colony. In view of the experience during the 1921 season it seems quite probable that the date of introduction for source III (August 11) is even too late for certain results each year.

In the case of uncertain queens how soon should they be replaced by another queen? During the season of 1920 all of the queens had an opportunity to prove their quality throughout the entire honey flow. Even before the honey flow it was possible to say that certain queens were not doing as well as others or even as well as the average of the yard. However, these queens were given assistance in one way and

another during the season in the hopes that they would eventually become good producing queens. The assumption was then made that a poor queen at the start seldom makes any surplus crop. There is such a wide variation in the constitution of queens that some do well or even excellent from the very start. Others never seem to attain the record which the apiarist has reason to expect. Weekly examination of colonies even if not in detailed manner will certainly reveal some lagging colonies. Such colonies should be indicated and given special attention. If such colonies remain below the average condition for the yard for a period of more than two weeks they should be replaced. When the building up period of the spring is well under way, when the spring honey flow becomes reasonably constant, a queen which slows up for two weeks is of doubtful value. Certainly if this slowing up occurs later during the period preceding the harvest it is even more disastrous. From careful observation it would seem that a queen may start on the decline at any time and without apparent cause.

If production is carefully watched it is necessary to get a good queen in every hive as soon as a queen shows any signs of failing. To be in a position to do this a system of "queen reservoir" has been put in operation. This is merely a 2-frame nucleus in a standard hive which is divided into three compartments. During the past season it was found that practically every queen introduced by the cage method into a nucleus was accepted. These nuclei were often composed of frames of sealed brood with clinging bees from two colonies. In this nucleus it was possible to observe how different queens started off and of course the best were always used first for introduction into colonies. Carried farther the nucleus should be a "proving grounds" for queens and thus reduce the possible number of inferior queens which may find the way to the head of colonies to be later replaced. In this way the loss in introduction was greatly reduced in the process of getting good queens in every colony. The details of apiary management of this queen reservoir were worked out quite successfully and will be still farther improved and tested during the coming season.

The introduction of the entire nucleus into a colony gave almost perfect results during the past season. In this way when a poor queen is taken away from a colony a good queen already organized in egg laying is given to it. Thus the colony routine is not interrupted for even the shortest length of time. This new queen which has been selected as the best of several nuclei commences her enlarged efforts without the least restrictions. The apiary management of this method has proved its value in the effort to get good queens in every colony with the least possible delay.

The success of introducing queen into nuclei and the success of introducing nuclei into colonies is an efficient method of overcoming what is the present uncertain production in queens. From the evidence given in the table it must be concluded that the beekeeper is supplied with queens of very indifferent production ability. The ultimate cost of getting a high producing queen in every colony is entirely too great. When a queen is purchased there is little assurance that she will prove of much value for honey production. She may have to be replaced and in turn the second and third replacements may prove unsatisfactory. The record of performance of the parents must be considered carefully before much performance can be expected of offspring.

FACTORS AFFECTING THE SUCCESS OF AMERICAN FOULBROOD CAMPAIGNS

By S. B. FRACKER, *Madison, Wisconsin*

It is a truism that the control of each distinct infectious disease constitutes a separate problem. The factors on which solution depends are many, including the means of distribution of the causative agent, immunity, education and civilization of the persons affected, and the relation of the disease to commerce and industry.

In the case of every disease, scientific effort is directed first toward the discovery of a cure for the individual victim; second, to the means of protecting other individuals from attack. Measures to prevent widespread epidemics develop last, and often require an elaborate study of the many factors in the situation before success is attained.

Methods of "curing" the individual colony of bees suffering from some form of brood disease were worked out more than a generation ago when it was found that taking the infected material away from the bees constituted a successful treatment. Developments during the past ten years in the control of European foulbrood constitute at once an improvement in method and a confession of failure. The discovery of varietal resistance and the ability of a strong colony to carry on its own public health activities relieves the beekeeper of serious worry about this disease, although the adoption of control measures on this basis is an admission of his inability to prevent its continued distribution.

American foulbrood, on the other hand, wherever established, promptly develops a "vicious circle" which perpetuates infection, resulting in some places in the destruction of the apiary industry. In the absence

of resistant races, the original method of the artificial elimination of infected material remains the only known means of saving the diseased colony.

Policies Adopted in Different States

Beekeepers suffering from an ever increasing loss from this source are trying four different methods of large scale control. First, attempts are being made in several states to "educate" the average beekeeper in the hope that enough of them will voluntarily apply prophylactic measures to result beneficially to the general welfare. The second means consists of inspection on request or suspicion and the requirement of a clean-up when disease is discovered. Florida is trying a third policy, that of putting inspectors into the field who are themselves destroying every colony which shows disease, together with all infected equipment. A fourth method, the one with which the writer is associated, consists of the inauguration of clean-up campaigns county by county, in which the work begins with educational measures and a survey of every bee-yard in the county, and ends with the destruction of material remaining infected after the campaign has progressed two or three years.

A study has recently been made of the results in various Wisconsin counties in an attempt to measure the factors affecting the success of this method of control. The fact that the data are drawn from the inspection records since 1918, of from 800 to 1,400 different apiaries per year, enables us to eliminate many of the individual differences, reduce the probable error and arrive at averages.

Some of the problems considered included the average rapidity of progress in disease control, the results of treatment as compared to destruction of the infected colonies, the effect of urban and rural locations on the incidence and control of disease, the relation of the size of the apiary and the experience of the beekeeper to success in treatment, the apparent sources of new infection, and the means by which disease was inadvertently retained in the apiary year after year.

Transportation of Second-hand Material

It was clear from early studies that the most important source of new infection consisted in the sale and transportation of bees and infected apiary equipment. This data has already been published, together with an outline of the regulations adopted to control it. The requirement that no bees or used bee supplies shall be moved or sold without a permit or inspection certificate has placed an effective obstacle in the way of this means of distribution.

Honey as a Source of Infection

With this source eliminated the first question was whether the introduction and sale of honey, bottled and otherwise, through the regular channels of trade would bring back disease into clean yards as a result of the exposure of the containers after they are emptied. This has not proved to be a serious matter. In fact nearly every Wisconsin city has remained free from American foulbrood until infected apiaries were introduced. Diseased yards were of course moved into certain cities, including Madison and Fond du Lac, years ago, but such places as Eau Claire, Superior, LaCrosse, Manitowoc, and Racine are still apparently free from this disease, while Sheboygan and Antigo have received infection in recent years through the introduction of diseased yards.

Another form of evidence on this point is the fact that reinfections are not occurring in serious numbers. The exact figures on this point are before me for only Milwaukee and Jefferson counties. Out of a total of 503 different yards inspected and reinspected during a three year campaign, a total of 180 were infected. During this period in the two counties only nine apiaries which were free from infection at first, developed disease from all causes during the campaign. Only half of these were inside the city limits of a city of over 1,000 population, although over 95% of the grocery and interstate honey business of the two counties was carried on in such places. The nine yards mentioned include all apiaries which might have been infected but were missed by the inspector when examined the first time, as well as those in the immediate vicinity of infected yards where the bees robbed out infected honey.

Treatment Compared with Destruction

Inspectors have always felt some doubt regarding the permanent effect of prescribing treatment rather than destruction for diseased colonies. Successful disease control in individual colonies, however, proves to be the rule rather than the exception, that is, American foulbrood may be retained in the yard but is almost without exception, eliminated from the treated colony.

Comparing the results of treatment and destruction, I find that in four counties, Dane, Jefferson, Milwaukee, and Calumet, we have the foulbrood record since 1918 of 163 infected apiaries in which we know the control method employed by the beekeeper. Of these, 64 applied the shaking treatment, while 99 destroyed their infected colonies, repeating as often as necessary. Among those who treated the diseased colonies less than one-half (27) had yards free from foulbrood at the

1921 inspection, showing that the others spread disease during treatment, or stored infected material where the bees had access to it. Among the beekeepers who destroyed the infected colonies, only one-fourth still had disease in their yards this year.

Over large areas the difference in result is great. In only one county could we say that the beekeepers have failed in their attempt to control foulbrood. That is a county which insists on *treating* infected colonies, and judging from the records the beemen of that county will still be "shaking bees" long after their neighbors have forgotten such disagreeable topics as bee diseases. In the other three counties named the number of infected colonies has been reduced to 3% of the total number examined and beginning in 1921 all infected colonies and material have been destroyed by inspectors as fast as discovered.

How is Disease held over?

In examining the records of apiaries which retain infection in spite of treatment, one is struck by the average size of the yard. Of all those beekeepers who failed to eliminate infection in three seasons, only two own less than ten colonies of bees and most of the yards are from thirty to one hundred in size.

This points the way to a solution of the problem. In large yards the honey house is full of infection; floor, tables, tools and extractor are daubed with diseased honey; many unsuspected extracting combs contain foulbrood bacilli; and after the bees are shaken, infected material is stored for a day or two before destruction. During the past season bees have been found gaining access to infected honey in supposedly bee-tight honey houses through the stove-pipe in one case, the keyhole in another, and through a crack in the cement floor in a third. It is still more common to discover a missing windowpane, a crack in the siding or a door often left open. Once the bees get in they have no trouble leaving, either through bee escapes at the windows or through the door as the owner goes back and forth.

The storage of infected material in the honeyhouse for even a few days is one of the largest factors in maintaining disease in the yard. Judging from experience in Wisconsin, it is a much more common source of danger than carelessness in handling the diseased colony itself, and in the serious nature of the results ranks with the failure to isolate infected supercomb.

The largest yards of all have more trouble with extracting combs than from any other source. Two beekeepers, one with 250 colonies, the other at one time owning over 700, have recently suffered serious

loss as a result of mixing the combs from diseased with those from healthy colonies. The first, through systematic selection seems to have successfully isolated the infected combs from the others in two years, but the second let his yard go down to less than 300 colonies before he finally gave up, and melted 100,000 combs.

Effect of Weather Conditions

As outside influences which may affect progress, the most important have been the effect of weather conditions on the honey flow. It is of course out of the question to allow the average beekeeper to apply treatment when no nectar is coming in. The summer of 1918, for example, was entirely without honey over a large section of the state. No pressure was placed on the beekeepers to destroy their infected colonies, they dared not treat, and as a result slightly more American foulbrood was found in 1919 in the areas begun the previous season than had been reported at the first inspection.

Rate of Progress

Progress in area clean-up work seems to follow a definite course when allowance is made for various outside influences. For example, in Jefferson and Milwaukee counties together, a total of 503 apiaries have been inspected, of which 323 have never been found with American foulbrood. Of the remaining 180, nearly one-half (86) showed disease in 1918 or 1919 but have been clean since. Of the other half, 44 were still infected in 1920 but were clean in 1921. Of those showing disease this season (50), 17 were either new yards which had been missed before, were outside the area covered in previous years, or had been free from disease at a previous inspection.

Beginning with 1919 the result has been a fairly uniform reduction of about 50% a year, in all heavily infected areas. Theoretically such a ratio would bring us to a single infected yard in each of these counties by 1923 or 1924, but it is hard to anticipate the results of the more drastic attack made on the few remaining diseased yards when the total number becomes reduced to a small percent.

The rate of reduction just given applies to all counties except Dane, in which many large infected apiaries are selling quantities of infected honey in their own locality. Here the amount of reinfection is discouragingly high, being related apparently both to honey sales and to the more pronounced economical tendencies of the beekeepers in this area. In Dane county the shaking treatment is used uniformly, and the same state of mind which keeps most of the beekeepers from destroying

the occasional infected colony, bees and all, also causes them to save every doubtful bit of equipment. That state of mind is fatal to success in the treatment of bee disease.

SUMMARY

To summarize, the factors governing the success of area clean-up campaigns are as follows:

1. Successful prevention of the sale or movement of used bee supplies.
2. Willingness on the part of the commercial beekeeper to take a few more steps than the absolute minimum requirement, even at a temporary sacrifice to himself.
3. Thorough cleaning of honey houses and preventing even the temporary storage of infected material in the apiary.
4. If treatment is being used, seasonal conditions which make treatment practical.
5. A persistent follow-up inspection, year by year as long as any infection remains.

When these factors are present and satisfactory, it is possible to reduce the amount of disease in large, heavily infected areas at a rate which should free them completely from disease in a reasonable length of time.

RELATION OF CLIMATE TO BEEKEEPING MANIPULATIONS

By H. F. WILSON, *Madison, Wisconsin*

Very few beekeepers realize the important influence of weather on beekeeping manipulations. It is true that this matter has been agitated more or less for a number of years but very little serious thought has been given to the subject. A study of weather records for different sections of the United States shows that there is a more or less definite set of conditions for the average year and with a proper knowledge of these conditions, our beekeepers can judge to a better degree what the spring, summer, fall and winter conditions are likely to be for their particular neighborhood.

It is true that there is a considerable variation so that in some years one might be very badly mistaken in his program. On the other hand it appears that certain weather conditions are more or less regular as for instance, in examining the weather records for the past ten years at Madison, Wisconsin, we find that there is a certain definite time, namely, March 10 to 15 when we may expect the first regular spring thaw and between March 20 and April 1 of each year, we know there will be a few days when the temperature is sufficiently high and the sun shining so that the bees can fly freely.

The relation of weather to placing bees in the cellar and setting them out again in the spring is important, far more so than our beekeepers will at first believe.

The Relation of Weather to Fall Conditions

Beekeepers in general differ a great deal regarding the proper time for putting bees in the cellar but usually they wish to wait until after the bees have had their last flight which keeps them out until after Thanksgiving or longer. As a rule this is a very bad practice, for too often the last flight never comes and if we are to take full advantage of the bee cellar the bees should not have to remain out-of-doors for two or three weeks of very severe weather at the beginning of the peroid of confinement. Our observations show that bees may safely take a flight on a sunny day when the temperature is 48° F in the shade. They do not normally fly on cloudy days, at much higher temperatures. Bees in the shade will not normally fly at 48° F. We find in comparing the weather records for the past ten years that on this basis bees had suitable weather conditions for a flight only three years of the ten after the first of December, the latest dates being December 4, in 1913 and December 13 in 1920. During the same period the bees might have had a flight only five times after the 20th of November and three of these years were the same as for the December flights. In 1915 a suitable day for a flight did not occur after November 13.

If the weather is warm during the fall and up to the last of November the bees are likely to have a day suitable for a flight near December 1. But if there is a heavy snowfall in October or about the first of November there is likely to be no opportunity for the bees to fly after November 20. It is quite evident then that bees have only a slight chance for a cleansing flight in December and less than half a chance after November 20. For this reason the beekeeper should plan to put the bees in the cellar not later than November 20 except in seasons where little or no snow has fallen previous to that date. Following that period the bees should be put in the cellar with the first snow storm.

The season of 1920 was far from normal and bees might have been left out of doors until December 20. However, bees in the cellar previous to that time were in no need of a flight and bees in outdoor cases did not fly to any great extent.

Relation of Weather to Spring Conditions

The time when bees should be set out in the spring is generally based upon the blooming of the willows and the majority of our bee-

keepers plan to remove the bees between April 1 and April 15. A few beekeepers remove the bees as soon as the snow disappears.

Here again the weather records of the past ten years give us an indication of how early the bees may be removed to advantage.

Bees should not be taken out while the ground is covered with snow. During the eight of the last ten years the temperature was high enough at Madison so that the bees could have had a cleansing flight between the 10th and 15th of March if the snow was melted away. However, the snow does not usually disappear before the fifteenth of March and after that time a suitable day for a flight is not likely to occur before the twenty-third. Practically every year a warm spell occurs between the twenty-second and the twenty-sixth of March so that if the bees need a flight they may be set out on the twentieth or sooner. with the assurance that they will be able to fly within a few days. In one year out of ten they may be able to fly before March 10. During the same period there was one year when a flight was not possible until March 26.

If bees are known to be short of stores they should be set out during the warm spell in March and given an abundance of sugar syrup to carry them over until the time when they can gather nectar in the field.

During the winter the temperature surrounding the cluster will be held at 57° F. as long as the bees have stores and energy to live, regardless of the cold outside. During that time the temperature may go below the zero point for a short period at a time, but it will range mostly from 20° F. or higher. The bees are then only required to develop an approximate average of thirty-seven heat units. In addition, they are not at that time required to use energy in the production of wax and food for the young.

As soon as brood rearing starts in the spring the temperature inside the cluster and around the young brood is increased to 90 to 95° F. At the same time the temperature will in the northern states run about 40° F., with fluctuations during March and April up to 65° F. Under those conditions the bees are forced to produce energy which will keep the temperature up to that of brood rearing, a difference of thirty to fifty heat units. During that time an excess of energy is also being used in producing larval food and possibly other products.

A practical illustration of how temperature influences the development of brood in the spring may be demonstrated by watching three colonies of minimum, medium, and maximum strength. By May the weak colony will have only a small circle of brood indicating the inside space covered by the cluster. This will also be more or less true of the medium colony, but the area of the brood nest will extend beyond the ordinary

winter clustering space. In the strong colony the brood nest will be several times larger than the winter clustering space and several frames may be filled from end to end. It is, of course, a recognized fact that strong colonies in the spring are able to build up strong for the honey flow.

In the northern states bees are often removed from the cellar and placed in exposed locations where the north and west winds sweep over them, causing a loss of temperature which can only be made up by extra work on the part of the bees and a consequent loss of energy which should be conserved for a greater expansion of the brood nest. The month of April is nearly always cold and the night temperatures frequently drop to near the freezing point. Whenever a cold wet spring occurs the bees have great difficulty in building up and always reach the honey flow in poor condition unless protected.

MEMORIAL RESOLUTION

The members of the Section on Apiculture now in session at Toronto do hereby resolve:

That whereas Mr. F. W. L. SLADEN, the late Dominion Apiculturist who was prominent in Scientific Research work in Apiculture, and

Whereas Mr. Sladen met his sudden death while carrying on research work in apiculture, and

Whereas the late Mr Sladen and his work were well known to most of the members of this Association, that the Secretary of this Section convey to the members of the late Mr. Sladen's family the sympathy of this Section.

Section of Horticultural Inspection

Friday, December 30, 1921

The meeting of the Section of Horticultural Inspection of the American Association of Economic Entomologists was called to order at 10:00 A. M., December 30, 1921, at the University of Toronto by the Chairman, Mr. A. G. Ruggles of St. Paul, Minnesota.

CHAIRMAN RUGGLES: The first paper on the program is an address by the Chairman.

ADDRESS OF CHAIRMAN

By A. G. RUGGLES, *St. Paul, Minn.*

For a horticultural inspector from the Middle West to address a meeting of this kind seems more or less presumptuous. In Minnesota we have very little of the real inspection work to occupy our attention.

The burdens of inspection fall to the inspectors to the east, south and west, particularly at coast points. These inspectors guard us and all we have to do is to watch for the stray insect wanderers. When we see what a task it is for the Californians and Floridans and the inspectors of the Federal Horticultural Board at the ports of entry, our work seemingly amounts to very little. And yet, I believe it is of such importance that it cannot for a minute be neglected.

In my opinion the policy in a state like Minnesota should be threefold.

FIRST—The educating of the nurserymen and dealers who grow plant stock to the necessity of being on the lookout for and to detect if possible important injurious insects and disease forms.

SECOND—Eliminating or absolutely controlling the injurious forms already present in the state.

THIRD—Maintaining quarantines to keep out or retard pests as long as possible, in the meantime putting on an educational campaign until the people get acquainted with the methods of control. For a state's clientele the logical sequence in maintaining strict quarantine regulations is as follows:—Education, gaining the good will and cooperation particularly of the nurserymen, and then the maintenance of any regulatory order. If the good will of the nurserymen is obtained cooperation in the enforcing of any quarantine is more easily acquired.

In furthering this program we have made it a practice in season and out of season to talk to nurserymen individually and collectively whenever possible on the desirability of being on the watch for pests and on the wisdom of trying to keep the areas into which they ship free from any new plant disease or insect. As we all know it is hard to prove to the nurserymen the necessity of submitting to certain detailed quarantines. As the nurseryman, as a rule, is one of the most intelligent men in the community, if we have a sensible program and he believes in us, the problem is half solved at the start. It will take time and patience on our part but we firmly believe in this method. We do not believe that it is necessary for a nursery inspector to be looked upon simply as a police officer. We try to rid the nurserymen of the idea that the inspector is trying to find something on the premises sufficient to avoid giving a clean "bill of health." We have always insisted that our inspectors hunt scrupulously for the bad pests but also when these were found that he help the owner on every occasion to eliminate the forms and at once if possible; that he talk the matter over with the owner and convince him that such and such a course is the one to pursue. Fortunately, we have had only a few instances when drastic measures were required.

One year we found San Jose scale in two or three nurseries. We assisted and advised in destroying, spraying and fumigating so that this year not a single scale was found in the nurseries of the state. At the present time we have a very bad infestation of the common oyster shell scale in the orchards, and a few nurseries of the state. Altho not as harmful a scale as San Jose we have insisted that the scale be eliminated from nursery stock. We have helped in three instances in the destroying and spraying of these trees before they were offered for sale. In our work with the White Pine Blister Rust we have caused to be destroyed large numbers of black currant and white pine and established a policy for the white pine nursery grower that currants and gooseberries must be grown at least half a mile from the white pine. Before we were sure that this disease had spread so generally thruout Minnesota, we caused to be destroyed many more plants of Ribes than we would advocate at the present time and yet we have had no "come back" from our growers. The idea is that if we do all we can to keep a disease or insect in check with the knowledge that we have at the time and play the game with our cards on the table, the nurserymen will stand back of us.

Being alert for all new forms and keeping our insect and plant disease survey as efficient as possible will certainly help in preparing for any emergency. Some insects are bound to get in, in spite of quarantines and other restrictions. For instance, *Crioceris asparagi*, was taken for the first time two years ago in a nursery near our eastern boundary. This insect, from reports of its spread this year, will be in a few years a pest of asparagus in Minnesota. A year ago in some gladioli bulbs from Holland we found an insect which is a bad pest of onions in Europe. It is impossible that we caught the only specimens of the insect, and if our climate is suitable, this insect must soon be added to our list of onion insects in the state. We do not know what the European Corn Borer will mean to us but we are getting prepared for it.

Reviewing our experience with the pests found in nurseries of the state, the question often arises as to just what has been accomplished in keeping these forms in check. It seems to me it simply amounts to this "to be forewarned is to be forearmed." In spite of our disarmament conference there are some things that we shall always have to fight, our principal weapon in all cases being "education" of ourselves and our constituents.

It is also possible in much of our fight against bad pests, at least in Minnesota, that we have had nature on our side. Even with the San Jose scale it may be that it will not live over a series of years with us. Some preliminary experiments seem to show this. Several years

ago we found a nest of the brown tail moth in a French importation. The caterpillars in this nest were alive and healthy, and were carried to maturity in the insectary. This is the only one we ever found. It does not seem possible that this was the only nest of live caterpillars of this insect which ever entered the state. As some experiments in eastern Canada seem to show, a very cold winter will kill the larvae. We often have very cold winters in Minnesota.

It would be a fascinating subject to think about and discuss what might have happened had Congress passed a quarantine act fifty years before 1912, with how many less pests would we have to contend today: or with how many less would we have to contend if Congress had passed a quarantine act in 1898 the year after Dr. L. O. Howard's recommendation. These are very interesting subjects but not all pertinent to the present. The pests that are here now are the ones we are interested in; these and their control, and the methods by which we can prevent any more pests entering the country are the subjects which most appeal to us at this moment.

CHAIRMAN RUGGLES: The next paper on the program is by R. W. Harned and H. H. Kimball.

THE SWEET POTATO INSPECTION SERVICE IN MISSISSIPPI

By R. W. HARNED and H. H. KIMBALL, *Agricultural College, Miss.*

So far as we know Mississippi was the first state to inaugurate a state-wide compulsory sweet potato inspection service. For several years the necessity of such an inspection service had been felt. This need had been emphasized by the large losses due to preventable sweet potato diseases that were being distributed throughout the State in seed sweet potatoes and sweet potato plants, and also by the danger of carrying the sweet potato weevil into uninfested sections of the State.

We do not feel that the Mississippi State Plant Board has started anything new or deserves any credit for any originality in this matter. The idea probably originally came to us while reading about certified Irish potatoes in other parts of the country. Probably a year before the Mississippi sweet potato inspection service was started, the State Plant Board of Arkansas under the direction of their Chief Inspector, Professor G. C. Becker, was urging the use of certified sweet potatoes for planting purposes. In fact, Professor Becker had a well organized sweet potato inspection service, but it was entirely voluntary. Anyone in Arkansas who wished to produce certified seed sweet potatoes could

have his potatoes and potato plants inspected by applying to the Arkansas State Plant Board and by paying certain fees. Early in the spring of 1920, while our plans for starting a sweet potato inspection service were still in a rather nebulous condition, the Cotton States' Entomologists had a meeting at Vicksburg, Mississippi, where in a personal conversation with Professor Becker we learned for the first time about the sweet potato inspection service in Arkansas and we immediately proceeded to adopt nearly the same system in Mississippi. Details of the Arkansas sweet potato inspection service may be found in Circular No. 9 of the Arkansas State Plant Board, Little Rock, Arkansas.

The chief difference between the two inspection services are that in Arkansas it is voluntary with the grower. A man may buy or sell certified seed sweet potatoes or may not do so and the growers of certified sweet potatoes must pay for at least a part of the inspection service. In Mississippi, it is illegal to sell or ship seed sweet potatoes or sweet potato plants that have not been inspected and certified. Every grower who expects to sell sweet potatoes for planting purposes must have his sweet potatoes and sweet potato plants inspected and certified. This service is paid for by the State and is rendered at no cost to the grower, except that he must pay for the numbered certificate tags that are issued at actual cost.

The sweet potato inspection service is very similar to the nursery inspection service. We adopted the numbered certificate plan that has been so satisfactory in our nursery inspection work,—one of the many excellent ideas that we copied from the State Plant Board of Florida. If at any time any serious disease or insect pest should be found attacking the sweet potatoes of any grower who has sold plants or potatoes for planting purposes, we can promptly locate all properties to which shipments have been made by this grower.

During 1921 each grower was required to send promptly to the Plant Board office a copy of the invoice accompanying each shipment of potatoes or potato plants. This invoice gave the name and address of the consignee and of the consignor, the quantity and variety of potatoes or plants and the number of the Plant Board certificate permit that accompanied the shipment. This was satisfactory except that there was no uniformity about the size, shape and appearance of the invoices sent in and there was often considerable delay in sending the invoices. To overcome these troubles, during 1922 the permit certificate tags will be made up of two parts each containing the same number. These parts will be divided by a perforated line so that they can be easily separated. Both parts will contain the same information—name and address

of consignor and consignee, quantity and variety of potatoes or plants and permit number. The tag part containing the eye will be attached to the shipment and the other part will be mailed at once to the Plant Board office.

The chief aims of the sweet potato inspection service are (1) to prevent the further introduction and spread of the sweet potato weevil (*Cylas formicarius*), of Black-rot (*Sphaeronema fimbriatum*), and of Stem-rot (*Fusarium batatatis*) (2) to control, reduce and if possible in time eradicate these troubles from the state, and (3) to prevent the introduction and spread of any other sweet potato pests that occur in other parts of the world, or that we may not know of at the present time.

The inspection service has been given plenty of publicity through the agricultural, daily and weekly papers that circulate in the state, by the county agents and by the railroads. Several posters have been issued that have been put up in public places in all parts of the state. The first two posters were copied from the Arkansas Plant Board posters through the courtesy of Professor Becker. Later, posters illustrating black and stem rot and the sweet potato weevil were issued.

The sweet potato weevil is only known to occur in the four southernmost counties of the State and a separate eradication campaign against this pest has been conducted for several years in cooperation with the U. S. Bureau of Entomology. Satisfactory progress has been made in eradicating this pest.

Black-rot and Stem-rot are quite generally distributed over the State and for years had been causing increasingly larger losses each year. Some farmers had stopped raising sweet potatoes, as their losses from disease had been so great as to make it unprofitable to try to raise them. It was common to hear men say that they had lost 50% or 65% or even 80% of their potatoes because of black-rot. We believe that losses of this kind are now a thing of the past in Mississippi. One interesting instance came to our attention only a few days ago. In a certain community last spring, all the farmers except one planted certified seed and took all the precautions that are recommended to avoid Black-rot. There was one farmer who said he did not believe there was anything to all that foolishness about preventing diseases and went ahead without taking any precautions. This fall when the farmers in this community hauled their potatoes to the community storage house the only one who had black-rot among his potatoes was this one man who did not believe in the inspection service. In another county a man who did not believe in the inspection service went over into another state in his automobile and smuggled in his supply of sweet potato plants. This fall the

diseased potatoes were so numerous in his field that he decided that it would not pay to even dig his potatoes. These men have probably learned to have a little respect for the inspection service.

Before seed sweet potatoes can be certified they must be inspected *at least* twice,—once in the field and once in storage. Potato plants to be sold must be grown from certified seed and besides these, seed must be bedded under the supervision of an inspector of the Plant Board, and must be inspected at least once not more than three weeks before any plants are removed from the bed.

The inspection service may be considered under three headings: (1) Field Inspections, (2) Storage Inspections, (3) Bed Inspections.

FIELD INSPECTIONS. A 10% infection of stem-rot at time of field inspection prohibits certification of seed. If less than a 10% infection of stem-rot is found all diseased hills are dug up and both vines and tubers burned under the supervision of a inspector who advises the grower to treat diseased spots in the field in the same manner that he treats his potato frame and beds in the spring—i.e.: apply corrosive sublimate or copper sulphate solution. Fields showing less than a 10% infection of stem-rot at first field inspection are re-inspected just before the potatoes are dug for the purpose of destroying all hills developing infection after the first field inspection was made.

STORAGE INSPECTION. Potatoes that are to be sold for planting purposes must be separated from eating potatoes before inspector arrives. (We urge field seed selection at digging time and the storage of seed potatoes as far away from the bulk of the crop as possible.) If black-rot or stem-rot is found during the storage inspection, and the grower still desires to sell a part of his crop for planting purposes, he must cull out all diseased potatoes from his seed stock and arrange for a second storage inspection at a later date.

When the field and storage inspections of a grower's seed sweet potatoes have shown them to be apparently free of serious diseases and insect pests, application is made to the State Plant Board for Seed Sweet Potato Permit Tags. The application is accompanied by an affidavit covering a number of points, among them the following:

The grower agrees to use permit tags on all seed sweet potatoes that he disposes of within the State of Mississippi. He agrees to dispose of only such seed sweet potatoes as have been inspected by an agent of the State Plant Board, and found to be apparently free of serious diseases and insect pests. He agrees to carefully inspect all sweet potatoes that are disposed of for planting purposes, culling out every potato showing the least sign of disease. He agrees to destroy all culled potatoes by

fire or to use them for eating purposes or to boil them thoroughly before feeding them to stock. He agrees to dip all seed sweet potatoes just before disposing of them for 10 minutes in a solution of corrosive sublimate—strength one ounce to 8 gallons of water.

BED INSPECTIONS. Beds must be made of soil in which sweet potatoes have never before been grown, and if old frames are used they, as well as implements used in preparing the beds, must be thoroughly disinfected. Sweet potato draws are certified under the following conditions:

Only such potatoes as have met the requirements for Mississippi certified seed sweet potatoes are used to produce plants to be sold or given away within the State of Mississippi. All certified seed used to produce plants are hand culled and disinfected immediately before bedding out, this is done under the supervision of an inspector of the State Plant Board. All beds of certified seed sweet potatoes are inspected by an agent of the State Plant Board not more than three weeks before plants are to be removed from the beds.

Growers outside of Mississippi must comply with the same standards met by Mississippi sweet potato growers before permit tags are issued that will enable them to ship into the state. The quarantine and parcel post inspectors located at about 20 strategic points throughout the state give us an opportunity to check very closely the movement of plants into and within the state. All diseased and uncertified plants are held up.

We believe that we have an effective inspection service and that the results have fully justified the hopes we had at the start.

MR. HASEMAN: I should like to ask Mr. Harned if the inspectors shown on the map are full time inspectors or part time.

MR. HARNED: We hope they are full time inspectors. The legislature convenes next month and if they treat us as well as they did before, they are full time inspectors.

MR. G. M. BENTLEY: We in Tennessee think this is a very important measure. We have a similar department, except possibly a little in addition; for example, supervising of the seed, seeing that the seed is dipped, the frames and so forth carefully treated, and that the plant beds have the proper environment.

Most of you know that the South is hard hit at this time. Cotton, farm products, and live stock are low in price, and the sweet potato is the one product not so affected. The demand for the slips is very great, not only in the state of Tennessee, but in the States of Arkansas and Mississippi, and the growers of Tennessee are intensely interested in these requirements. There are four counties in the state which, if they

pass inspection, can live upon the millions of slips shipped out. Our growers consider it a very important step in the agricultural problem, and this is something too that will influence a great many of the Northern states, since the sweet potato has been found to grow well, and profitable yields have been made in that section.

I think we should all express our confidence in the measures adopted by Mr. Harned in the state of Mississippi.

CHAIRMAN RUGGLES: If there are no more remarks, we will pass on to the discussion of a paper presented at the Chicago meeting by H. F. Dietz, "Some Problems in Greenhouse Inspection in Indiana."

MR. SASSCER: I purposely put this paper on the program in the hope that it might provoke some discussion. Unfortunately, Mr. Dietz' paper was read last year at the end of the session, and there was little or no time for discussion.

I don't know how much problems of this kind affect state inspectors, or how far you attempt to go into inspection of materials distributed from greenhouses. We in Washington, however, are seriously concerned about this problem.

As many of you know, the Department of Agriculture is constantly introducing new plants from remote parts of the world. During the past ten or fifteen years we have intercepted many insects new to this country, and it is impossible to tell what would have been the result if they had been allowed to become established.

Our practice is to examine this material carefully in the inspection house upon arrival, and if there is the slightest doubt as to whether there is any danger, or if an insect new to us is found, the material is either burned, fumigated, or otherwise treated, and grown in what we style a "quarantine house." As soon as the danger has disappeared, this material is allowed to go to the field station at Bell, Maryland. We have taken the stand that it would be taking an unnecessary risk to allow material to leave the Bell greenhouses without an inspection at the time of shipment.

I might say that the greenhouses at Bell, at the present time, so far as we know, are infested with only the common greenhouse insects, but it frequently happens that we have a new pest under our eyes for six or eight months and do not recognize it as such. For that reason we are carefully inspecting the plants, not a month or seven weeks before, but at the time of shipment.

Temperature conditions in a greenhouse are comparable to the tropics. An inspection today is not good two weeks hence. I should like to have some expression as to whether or not the inspectors representing the

various states at this meeting are of the opinion that we are taking unnecessary precautions. Would you be willing to accept the material which is distributed from the greenhouses in question with one inspection a year, or two or three inspections a year; or do you think we have adopted the right policy in inspecting at the time of shipment?

If we are going to ship material from a greenhouse, what kind of a certificate should we use? Are the state inspectors going to accept qualified certification? Would you accept plants from us if you knew they were infested with the common greenhouse insects? As most of you no doubt know, we now have a law in the District of Columbia which requires that all plants entering should be inspected and certified. We have an inspector at the post office, the express office, and the freight office, and during the past two months one hundred and twenty-two shipments have passed through the post office and express office which did not bear certificates of inspection, and thirty-five of these shipments were infested with common greenhouse insects such as the common mealy bug, greenhouse white fly, etc.

I think I am safe in assuming that very few, if any, of the states are inspecting, and if they are, they are not certifying material which is distributed from greenhouses.

MR. F. N. WALLACE: I would like to ask Mr. Harned if they are going to pay attention to greenhouse stock down in Mississippi.

MR. HARNED: All plants coming into the state have to go to one of the parcels post inspection stations and are there inspected. We have six of them in the state. Our quarantine inspectors get most of the things that come in on trains, greenhouse plants included.

MR. J. J. DAVIS: At a meeting at La Fayette last winter, of the entomologists of Missouri, Illinois, Ohio, and Indiana, this matter was briefly discussed, and in our mimeographed report we made a statement regarding greenhouse inspection work. I don't recall the exact statement, but it was to the effect that very probably we could divide the insects of the greenhouse into two distinct classes—those generally distributed throughout the United States, and those which had a comparatively local distribution. In discussing this matter, it seemed desirable that those with local distribution should be restricted; that is, that plants infested with the insects of local distribution be restricted from shipment, and that restrictions should also apply to our common insects where the infestation was serious. But where the infestation was very light and normal, there probably need be no further restrictions on shipments from state to state.

MR. SASSCER: Mr. Harned, do you certify greenhouse stock?

MR. HARNED: In Mississippi at the present time we are inspecting the greenhouses. If we find anything of a serious nature, we quarantine that greenhouse until it is cleaned up. If we find any of the common insects very abundant, we require them to clean up before they can continue selling plants. But we are not certifying any of them at the present time. We have that matter under consideration and we are doubtful as to the best way of handling it.

MR. WALLACE: Is the date of your inspection put on the shipping tag?

MR HARNED: We are not issuing shipping tags to the greenhouses. We are inspecting them and letting them do business locally. If they are shipping things out by mail, they have to have a permit to do so, and that is also true with express. But we are letting them sell locally without permits.

MR. WALLACE: We inspect our greenhouses if a man wants to ship, but I will be perfectly frank in saying that the inspection tag, when it says that it is free from insect pest or plant disease, doesn't mean a thing. It means that we were reasonably sure that there was nothing injurious at the time we inspected.

But as Mr. Dietz made plain, a man might bring in something from another greenhouse the very next day and reship it under his tag. It is not only in Indiana but I think that thing is happening in all of the states. We don't want to start anything in Indiana and penalize our greenhouse men; and if it is not feasible with all the states we don't want to start it. I can't stop our men from shipping. They send up to Chicago and get the plants there. Or, as happens now, we can sell to a broker in Chicago and he resells to another broker, who ships it out and the man who buys it doesn't know where it comes from.

MR. P. A. GLENN: We are puzzled in Illinois to know what to do with our greenhouses. Our law eliminates greenhouses from inspection and they are not required to be certified, but in some of the states they require certificates in order that our greenhouse men may ship stock into those states. One particular state has asked me to issue to certain greenhouses a certificate covering a year. I hardly see how a certificate could be issued on a greenhouse covering a year. They really ought to be inspected every two or three weeks, or every shipment that goes out ought to be inspected. Every shipment ought to have an effective inspection. But it has been our practice in Illinois, when greenhouses wanted to ship to another state where they require inspec-

tion, to issue to our greenhouses a certificate reading like this: that they are practically free from the usual greenhouse pests and are apparently free from danger.

Of course, if a greenhouse has scale all over its palms, we refuse to issue them a certificate at all for palms. Or, we require them to agree not to ship any palms under a certificate we give them, and the certificate will apply only to stock in their greenhouses which seems to be free from scale or insect pest. We issue certificates to only those greenhouse owners who seem to take all the reasonable precautions to keep down the common insect greenhouse pests. It would be an awful job in Illinois to inspect every shipment that is sent out from greenhouses; in fact, it would be impossible.

MR. T. J. HEADLEE: I have felt for a number of years that the handling of the greenhouse stock situation should be given attention, and if Mr. Sasscer believes that the information that we now have on the different species of insects as to dangerous character, has gone far enough, I would like to make a motion that a committee be appointed, to throw this whole matter into some sort of definite shape for consideration at the next meeting. But I would like to have Mr. Sasscer answer the question first, as to whether he feels that the information along this line has gone far enough to permit reasonably fundamental action.

MR. SASSCER: Doctor Headlee has asked a question that I don't believe I am competent to answer. If anyone had told me several years ago that the strawberry root worm would have become a rose pest in greenhouses, I would have been inclined to doubt him. Take the chrysanthemum midge for example. We fought desperately to keep it out of the Washington greenhouses, but it finally became established.

The great difficulty, it seems to me, is to determine what is an injurious insect in a greenhouse. Some five or six years ago the Bureau of Entomology initiated a project for the purpose of studying insects infesting ornamental plants in greenhouses, and a large mass of data has been assembled. Previous to undertaking this problem, Mr. J. J. Davis had been working up a bibliography of greenhouse insects, and he was generous enough to turn it over to us. However, there are a great many insect pests in greenhouses at the present time of which we know little. I am afraid that I am not in position to say that we know enough about greenhouse insects to lay down a definite rule that will hold for five or ten years.

MR. HEADLEE: I believe I will make the motion anyway, because we are in very much the same boat in all lines of insect work. I don't

know as much about them as I should. So I move that a geographically representative committee be appointed by the Chair with Mr. Sasscer as chairman, to take this matter under consideration and see whether any general rules, fundamental principles and recommendations can be laid down, this committee to make its report at the next session of this section.

MR. S. B. FRACKER: I second the motion. A number of our men in Wisconsin keep a little outside shrubbery in order that they may be entitled to carry a nursery inspection certificate, and they attach it to greenhouse plants when requested to do so by the express agent. This is true particularly of inter-state shipments. The problem, we have felt, was a serious one, not only owing to the dangers from some of the insects mentioned by Mr. Dietz, but in other ways. For example, the orchid weevil, *Cholus cattleyae*, has been distributed from one greenhouse to another by means of stock, and its distribution could probably have been prevented if inspection certificates had been required. It is an insect which is perfectly ruinous in the orchid houses when it once becomes established.

The motion of Mr. Headlee, seconded by Mr. Fracker, was voted upon and carried.

CHAIRMAN RUGGLES: The next paper on the program is "Important Foreign Insect Pests Collected on Imported Nursery Stock in 1921." by Mr. E. R. Sasscer.

IMPORTANT INSECTS COLLECTED ON IMPORTED NURSERY STOCK IN 1921

By E. R. SASSCER, *Washington, D. C.*

Exclusive of bulbs and seeds, 27,507,929 plants were introduced during the fiscal year 1921 from all foreign countries in compliance with Regulations 3 and 14 of Quarantine 37. Of this number, 21,172,049 plants arrived from France, the remainder being distributed among all other countries exporting to the United States. In spite of the emphasis which has been repeatedly made regarding the necessity of shipping only plants free from soil or earth, a number of shipments of plants, the roots of which were in part embedded in soil, arrived. Moreover, in several instances the soil included in the matted roots of Astilbe from Holland was found to be infested with the larvae of *Brachyrhinus sulcatus* Fab. which would have escaped the notice of the inspectors if the soil had not been detected, removed, and carefully

examined. While these larvae were for the most part in the soil, in some cases they had entered the clumps and occasioned some injury to the roots. In all of the shipments it was evident that an effort had been made to remove the soil, but the small amount remaining was sufficient to protect the larvae and permit them to accompany the plants. While it is true that the insect in question is known to be established in certain sections of this country, this instance forcibly emphasizes the possibilities which accompany the introduction of plants imbedded in soil.

Forty-two shipments of French fruit and rose stocks were found to harbor nests of the Brown Tail Moth in contrast with sixty-three from the same country during the past eight years. Incidentally, a number of these shipments also contained nests of the White Tree Pierid (*Aporia crataegi* L.). One shipment of fruit seedlings from Holland was infested with nests of the Brown Tail Moth and one consignment of quince stock from France contained egg masses of the Gypsy Moth. Larvae of the Sorrel Cutworm (*Acronycta rumicis* L.) were collected on quince, cherry, and rose; and pupae of the Dagger Moth (*Apatela auricoma* Fab.) were reported on pear, quince, and rose from France, and cherry from Holland. Narcissus bulbs from Holland were infested with the Lesser Bulb Fly (*Eumerus strigatus* Falln.); iris from England with *Anuraphis tulipae* Boyer, and *Lilium candidum* from France with *Cryptothrips dentipes* Reut. Egg masses of the European Lackey Moth (*Malacosoma neustria* L.) were intercepted on three shipments of French apple seedlings, and cocoons of *Emphytus cinctus* Linn. were taken on rose stocks from England, Ireland, France, and Holland.

The Black Fly of Citrus, *Aleurocanthus woglumi* Ashby, was collected on the foliage of citrus on nine occasions from Cuba and Jamaica, and once on what appeared to be bay from the Bahama Islands. In a majority of these cases, the eggs and pupae were on leaves attached to fruit found in the stores of ships arriving at American ports of entry. *A. spiniferus* Quaintance also arrived on citrus leaves from Japan. The Mexican Fruit Fly (*Anastrepha ludens* Loew) was intercepted in mangoes and sweet limes confiscated from immigrants at El Paso, and larvae of *A. fraterculus* Wied. were found in mangoes and Cuban plums from Cuba, Mexico and Jamaica. The Mediterranean Fruit Fly was taken on five occasions in coffee berries from Hawaii, and what appeared to be larvae of *Conotrachelus perseae* Barber was located in avocados from Mexico and Costa Rica, as well as a species of *Heilipus* from Mexico and *Stenoma catenifer* Walsh from the Canal Zone and Mexico. Mango seed from Hawaii exhibited the Mango Weevil (*Sternochetus mangi-*

ferae Fab.), and sweet potatoes from Cuba and Mexico contained *Cylas formicarius* Fab., and shipments from Jamaica, the Bahama and Madeira Islands were infested with *Euscepes batatae* Waterhouse. *Metamasius sericeus* Oliv. was intercepted in sugar cane from Cuba found in ships' stores and in banana leaves in banana shipments from Costa Rica. The pink bollworm (*Pectinophera gossypiella* Saund.) was intercepted in cotton seed from England, Egypt, India, and on twenty-three occasions in cars arriving from the interior of Mexico.

Azaleas from Japan, introduced in accordance with Regulation 14, Quarantine 37, were in a number of instances found to bear injured buds. Repeated futile attempts were made to collect the insects responsible for the hollowing out of the buds. Samples of the injured buds were forwarded to Dr. S. I. Kuwana who advised that it was the work of the larvae of *Earias rosifera* Butler, which is reported to have two generations a year, the adult moth of the first brood appearing in April or May, and the second brood in July. The moth of the last brood deposits its eggs near the flower buds, and the larvae infest the buds shortly after hatching, and become full grown in September or October, hibernating in the larval condition in cocoons in the soil or between decayed leaves. In view of the fact that the exporting season in Japan is from November to April, and that the insect is in the soil or in old leaves at that time, and further that these plants are shipped absolutely free from soil, it appears that there is little likelihood of introducing this pest.

The Noctuid genus *Earias* contains some two dozen or more closely allied and similar species, several of which are known to be of primary economic importance; for example, *E. insulana* Boisduval, which is the well known Egyptian Cotton Bollworm, and is second only to the Pink Bollworm in the amount of injury it occasions to cotton in that country. *E. chlorana* Hubner is another injurious species feeding on willow in Europe.

The following is a list of some of the more important scale insects arriving on plants from various countires:

Coccid	*Host*	*Origin*
Asterolecanium urichi Ckll.	*Guiliema speciosa* (Palm)	Brazil
Chaetococcus bambusae (Mask.)	Bamboo	China
Lecanium corylı L.	Cherry cuttings	Germany
" " "	Apple scions	Czecho-Slovakia
" " "	Prune (cuttings)	"
" " "	Cherry (scions)	"
Pseudococcus gahani Green	*Tricuspidaria dependens*	England
Pseudococcus maritimus (Ehrh.)	Bananas	Central America

Coccid	*Host*	*Origin*
Ripersia palmarum Ehrhorn	Cocoanuts	Raratonga, Cook Isl.
" " "	"	Hawaii
Aspidiotus spinosus Comst.	Rose	Bahama Islands
Aspidiotus subsimilis Ckll.	*Persea americana*	Ecuador
Aspidiotus subsimilis var. anonae Houser	*Areca sp.* (Palm)	Cuba
" " " "	Sour sop	Bahama Islands
" " " "	Unknown	Cuba
Chrysomphalus scutiformis Ckll.	Bananas	Central America
Odonaspis inusitata (Green)	Edible bamboo	China
" " "	Bamboo	"
Odonaspis sp. (apparently new)	*Arundo mauritanica* (Rhizomes)	Algeria
Targionia sacchari (Ckll.)	Sugar cane	Bahama Islands
" " "	" "	Br. Honduras
Targionia sp.	*Populus subintegerina*	Algeria
Chionaspis inday Banks	Cocoanuts	Hawaii
Lepidosaphes ficus Sign.	Fig	Italy
Lepidosaphes tuberculata Malen	Orchid	England
Lepidosaphes mcgregori Banks	Cocoanuts	Singapore
Phenacaspis eugeniae Mask	"Kukui" nut	Hawaii
" " "	Mango	"

SUMMARY OF COUNTRIES AND THE NUMBER OF SPECIES OF INSECTS REPORTED BY STATE AND FEDERAL INSPECTORS DURING THE CALENDAR YEAR 1921 UP TO AND INCLUDING DECEMBER 23

Algeria	4	Colombia	6
Antigua	1	Cook Island	3
Argentina	12	Costa Rica	10
Assam	1	Cuba	80
Australia	9	Czecho-Slovakia	4
Austria	1		
Azores	3	Ecuador	13
		Egypt	4
Bahama Islands	28	England	42
Bermuda	21		
Brazil	20	Fed. Malay States	4
British Guiana	12	France	51
British Honduras	6	Germany	6
British West Indies	6	Gaudeloupe	1
		Guatemala	16
Canada	4	Haiti	7
Canal Zone	10	Hawaii	49
Canary Islands	2	Holland	35
Ceylon	2		
Chile	9	India	32
China	33	Ireland	5

Isle of Pines	3	Salvador	1
Italy	82	San Domingo	7
Jamaica	50	Seychelles Islands	1
Japan	47	Siam	14
Java	10	Sicily	1
Jerusalem	1	South Africa	14
		Spanish Honduras	35
Madeira Islands	7	Spain	13
Malta	1	St. Kitts	1
Manchuria	1	Straits Settlements	8
Martinique	1	Sweden	5
Mexico	64	Syria	1
New Zealand	4	Tahiti	1
Nicaragua	7	Trinidad	4
Norway	4	Tripoli	1
Palestine	3	Turkey	1
Panama	12	Turks Islands	1
Paraguay	4		
Philippine Islands	17	Uruguay	4
Porto Rico	10	Venezuela	6
Portugal	2	Virgin Isl.	3
		Windward Isl.	1

CHAIRMAN RUGGLES: The next paper is by Mr. McLaine

A BRIEF RESUME OF NURSERY CONDITIONS IN HOLLAND, BELGIUM AND FRANCE

By L. S. MCLAINE, *Ottawa, Can.*

During the early summer of 1921 the writer had the pleasure of visiting France, Holland and Belgium. The main object of the trip was to se some of the larger nursery sections, as well as to look into the methods employed by the various governments in the inspection of nursery stock for export, particularly to North America. Unfortunately only a very short time could be alloted to any one locality or country, thus making it impossible to secure any definite first hand knowledge of the insects that are likely to be imported on exportations of plants or plant products. The writer, however, was impressed with the serious effort that was being made, in most instances, to inspect thoroughly all export shipments and to see that only healthy plants were shipped under the certificates of inspection.

The situation of the nurserymen on the continent, from a financial standpoint, is by no means enviable at the present time. During the war their business was at a standstill, and to-day it is little

better. Their trade with Russia, Germany and the central European countries is gone, and with the other countries there is keen competition and unending difficulties on account of disturbed trade relations and rapid fluctuations in exchange.

The nurseries on the continent are for the most part owned by old and well established firms whose business has been handed down from father to son for several generations. The nurserymen with whom the writer came in contact were men who took a pride in their craft and in the way the nurseries were cultivated and cared for.

HOLLAND

The nursery districts in Holland are widely separated and each district usually specializes in one particular type of stock according to the soil or climatic conditions. The seven main nursery sections are located in the following districts and specialize in the plants mentioned below:

Veendam—Fruit stocks.

Hillegom—Lisse—Sassenheim—Bulbs and Peonies.

Boskoop—Ornamentals, Rhododendrons, Boxes, Laurels, Roses, Hardy Azaleas, etc.

Nardeen—Clipped and fancy Boxes and Yews, Lilacs and Ornamentals.

Oudenbosch—Fruit seedlings.

Zeeland—Forest seedlings.

Aalsmeer—Cut flowers.

The writer was only able to visit the Hillegom and Boskoop districts, and the headquarters of the inspection service located at Wageningen.

BULB DISTRICT. A large area in the vicinity of Hillegom and Lisse is devoted to the growing of bulbs and one of the larger firms has about six hundred acres devoted to their cultivation. Intensive cultivation was noted throughout the entire district, and as the best land is exceedingly valuable, it is not allowed to remain idle for any length of time. The soil is of a light sandy nature; the fields are small, usually protected by wind breaks and are separated by small canals. The bulb land s manured heavily every five or six years, and a field crop grown the first year after manuring. The bulb crops are rotated each year; at first tulips, then daffodils, etc. Two crops of the same species are never grown on the same land two or more years in succession.

The Dutch government has maintained a phytopathological laboratory at Lisse for the past five years, where extensive experiments are being carried on in connection with the diseases of bulbs. In 1910 a serious disease of narcissi and daffodils was found in this district. According to Dr. Van Slogteren, the expert in charge of the investiga-

tional work, the disease is caused by eel worms. When the disease is found in a bed, the diseased bulbs, all the healthy bulbs in the vicinity as well as the earth are removed and burned. Experiments have proved that the soil can be freed from the disease if bulbs are not planted on the same land for a number of years, but the value of the bulb land prevents this; furthermore, it takes years for the complete disintegration of all parts of the affected bulbs. Dr. Van Slogteren also stated that experiments with heating bulbs in warm water at 40° C. for a number of hours killed the eelworms and did not injure the propagating qualities of the bulbs; further experiments in connection with the effect on the forcing qualities are now being carried on.

Meredon sp. is reported as being rarely a serious pest but it does occur occasionally however in fields that are too well protected by wind breaks.

Boskoop. This is the centre of the ornamental trade and approximately two thousand acres are devoted to the growing of nursery stock. Previous to the war this acreage was divided among three hundred nurserymen, the majority of whom were small growers. There are now about twenty large firms in the district, holding from ten to fifty acres and up, of land. About one hundred and fifty firms do a direct export business and the remainder sell their plants to the larger firms. The nursery industry was first started in this district two hundred years ago. The nurseries are laid out in narrow strips, between canals, averaging 150-300 feet wide and from one-quarter to a third of a mile long. They appeared in most excellent condition, were free from weeds and no sign of either the gipsy or brown tail moths were seen.

Plant Inspection Service. The organization of the Phytopathological Service has been outlined in a special bulletin prepared by the service[1] so it is unnecessary to consider it in detail at this time. The nurseries are inspected frequently throughout the summer, and instructions are issued to the growers to spray or carry out any other treatment when such is considered necessary. If the instructions are followed a "general certificate" is issued to the grower, without which he may neither dispose of his stock locally nor secure an export certificate. Written records of all certificates are kept, and if for any reason a grower can not account for all the certificates forwarded to him, no additional certificates are issued until a satisfactory explanation is furnished. In the Boskoop district the local government requires the

[1]The Phytopathological Service in the Netherlands, No. 13, 1921. Wageningen, Holland.

spraying of all boxwoods during the winter months. A so-called "spraying brigade" has been organized to take care of the work on the smaller holdings.

Serious outbreaks of the brown tail moth are reported as unusual in Holland, although they do occur occasionally in the Limburg district. The gypsy moth is reported as rare.

Belgium

The great greenhouse district in Belgium centres around Ghent and Melle. Before the war this was a very prosperous community, with fine ranges of greenhouses, good packing sheds, etc., but as this area was occupied by the Germans from the summer of 1914 until 1918 business was practically at a standstill. During the occupation many firms were unable to obtain any coal for their greenhouses, whereas, others could secure only a sufficient quantity to maintain a temperature of between two and four degrees centigrade in their houses during the coldest weather, consequently many lost heavily. The growers in this area devote their attention almost entirely to the propagation of azaleas, palms, araucarias, aspidistras and rhododendrons.

Great care is taken in the preparation of the soil for the propagation of azaleas. The soil in which they are grown is of a heavy peaty nature, and brewers or malt grains are used as fertilizer. The slips are planted in pots in the spring, and grafted in August. The plants are kept in greenhouses during the winter, placed outside in May and returned to the greenhouses in September. While outside they are often covered with mats or frames to form partial shade. The plants are examined several times during the season and packed for export in the nursery rows. The larger firms propagate from twenty to fifty thousand azaleas a year. The majority of growers in this district do not export but sell their products to the larger firms.

Belgian Inspection Service. The inspection service is organized on a similar basis to the corresponding service in Holland, and was started in 1912 as a result of the United States quarantine brought into effect that year. The Chief Inspector is stationed at Ghent and has a number of inspectors associated with him. The nurseries are inspected at least twice each year and a report as to their condition is submitted to the Chief Inspector. If this is satisfactory, the nurseryman is furnished with a "general certificate," without which he may not dispose of his stock, even locally. The "general certificate" must be produced before an export certificate is issued. The stock is then re-examined at the time of shipment and if found clean the shipper is furnished with the export certificate.

FRANCE

The great fruit seedling nurseries are located in the vicinity of Orleans and Angers in the Loire district. The chief plants grown for export are fruit, rose and conifer stocks, although ornamentals, grafted and budded roses and perennials are grown in very large quantities.

In the Orleans district the number of firms that really do an export business does not exceed ten, whereas there are about five hundred growers altogether. All the large growers contract with farmers in the surrounding district to grow fruit stocks for them. About twelve hundred and fifty acres of land are devoted to the growing of nursery stock. One firm propagates one million fruit stocks, and three million roses a year; they also graft about six hundred thousand, and bud two hundred and fifty thousand roses. The small cultivators grow about ten million seedlings a year.

In the Angers district which is larger in extent than the foregoing, there are about six large exporters and about fifteen hundred to two thousand small cultivators.

The apples are grown from the seed of wild native apples, planted broadcast in beds very early in the spring (February), as soon as they are well started they are transplanted to beds and placed in rows, and are usually sold as one or two year transplants. The seedlings are dug in November, and packed and shipped in February.

FRENCH INSPECTION SERVICE. The inspection service is divided into two main divisions (1) entomological, (2) phytopathological. The entomological service is in charge of a Director with headquarters at Paris. The service is further divided as follows: (a) inspectors, who visit the various nurseries which have plants for export, and see that the latter are free from pests, they also deliver the certificates; (b) the assistant inspectors act as general assistants to the inspectors in their work; (c) the controllers are resident in the district to which they are attached; they pay special attention to the general condition of the plants. During the summer one controller and two inspectors were stationed at Angers and two inspectors at Orleans. All the nurseries are inspected twice each year in the spring or early summer and in the fall. The inspectors visit the nurseries at time of packing but are not present at any one nursery throughout the season.

A serious outbreak of brown tails has been present in the Loire district for the past three years. An attempt has been made to clean up orchards in the vicinity of nurseries, by the removal of winter webs, and no old nests were actually seen in the nurseries themselves. Last year the Department paid out thirty thousand francs for the collection of winter

webs, five francs per thousand was the amount first allowed, but this was later reduced by one half. Owners are required to remove the nests from their property and many prosecutions followed cases of neglect. The outbreak was first noted in the environs of Paris, stripping of oaks, hawthorns, and elms were plainly visible from the train and even the hedges along the railroad were defoliated.

CHAIRMAN RUGGLES: The next paper is by S. B. Fracker.

THE LEGAL ASPECTS OF PEST CONTROL

By S. B. FRACKER, *Madison, Wisconsin*

Up to within the last few years the only pests receiving legal attention were those we did not have and did not want. Little or no consideration was given to established insects altho they are causing 99% of the total losses. Research and education require no enactments by legislative authority, and extension activities constituted the only means of making entomology really "economic." For until the facts discovered by research are used in actual practice, science cannot be called "applied."

The great weakness of pest control so far is in connection with those species which should receive simultaneous attention over large areas. The Pacific Coast states have progressed much farther along these lines than other sections and have definitely recognized that pest control is a proper function of government. The ever-increasing losses from insects and plant diseases have now reached a point where they are of great public concern, and leaving the whole matter to the individual owner is no longer sufficient.

Kansas has recognized this in the case of grasshopper outbreaks and has passed a special statute providing for county and township grasshopper campaigns. In considering the organization of similar control work against the same insects in Wisconsin two years ago, the writer investigated the whole question of the legal status of pest control in the various states, and was surprised to discover that in most cases it had not gone beyond the stage of nursery inspection.

The statutes required in the case of firmly established insects are of a different type from the mandatory regulations governing nursery inspection, and quarantine orders. The need is for political machinery to handle funds, buy material, and supervise the mixing of sprays and poison baits. In the case of grasshoppers, for example, town or county board members are the logical local officials to buy poisons and attractive baits for distribution. This is much more satisfactory than to leave

the whole matter to the individual farmer, who is helpless unless the local stores voluntarily stock the needed materials. Such an arrangement, in effect, makes the town board both the pest control organization of the locality and a clearing house for information regarding the prevalence and control of injurious insects and plant diseases.

Usually the powers of local officers are closely restricted by state laws. In Wisconsin we found that new legislation was essential to enable towns and counties to make appropriations for such purposes, and to buy and sell the necessary supplies. At the same time it appeared to be as unreasonable to ask the passage of a new law regarding each specific insect pest or plant disease as it would be to provide a special statute for each human ailment. California has followed both policies. In addition to organizing a horticultural commission (now in the department of agriculture) with wide powers and extensive authority, the legislature has passed a series of special statutes on such subjects as the walnut codling moth, date palm scale, and Phylloxera. Many states, when faced with the barberry eradication problem enacted special barberry laws and whenever a new problem in the control of a disease with alternate hosts comes up under such conditions, a new legislative enactment will be necessary.

The solution adopted in Wisconsin was the passage of a bill providing authority for county boards, town meetings, town boards, and village boards to make appropriations for the control of insect pests, weeds, or plant or animal diseases. Advantage was taken of this opportunity immediately after passage of the bill, and county and town appropriations have since been made for grasshopper control, cattle tuberculosis, and apiary inspection. Action by town and county boards, it was felt should not be made mandatory under our conditions altho this may be necessary in the grasshopper infested regions of the great plains.

An additional clause required the state department of agriculture to provide technical assistance and direction in the expenditure of such funds, the purpose of this being to unify the work and prevent the waste of county and town resources. The form of organization is thus similar to that of public health work, very elastic but possessing full authority and the administrative machinery to cope with varied situations.

If we will then divide pest control problems into three classes from the standpoint of public interest, the requirements of an inclusive pest control program become apparent. First come those insects or diseases which threaten a locality but have not yet reached it; second, new arrivals whose distribution is spotted; third, native, or strongly established introduced forms, calling for repressive measures rather than extermination.

For preventing the introduction of outside insect pests and plant diseases, every state except three, has one or more quarantine regulations. In some cases statutory authority for the establishment of such measures seems to be weak or wanting and in others must be construed from a phrase which grants power to make regulations for the administration of nursery inspection. But in 45 states such orders have at least been "promulgated" by the powers that be.

Retarding the dissemination of localized pests is a similar problem for which more specific authority is usually granted. Nursery inspection regulations are in this class. One might mention here a favorite phrase of the lawmakers of the gulf states contained in several statutes of this group of commonwealths: "The department is authorized to make such rules and regulations, and *to do and perform such acts*, as may be needed to prevent the introduction and dissemination of insect pests and plant diseases."

To summarize, our pest control statutes should provide:

1. For the organization of a plant inspection and pest control office or department.

2. The usual administrative powers: access to premises, examination of possibly infested material; and enforcement of treatment or destruction when needed.

3. Specific authority to regulate the introduction and transportation of material either infected, exposed to infection, or from infected or infested areas within or without the state.

4. Authority to prohibit the introduction, transportation or harboring of plants whose damage consists in their being the alternate hosts of diseases already present, such as barberry bushes in grain growing regions, and Ribes in the white pine forests.

5. A form of organization for the local control of permanently established pests thru local civil officers or special horticultural or agricultural authorities, and the power to make local appropriations for these purposes. Such action need not be made mandatory on local officers unless it is demanded by their constituents, or in case their neglect would result in loss to other localities.

MR. BIGGAR: By whom are those inspectors appointed?

MR. FRACKER: The different states vary a great deal. It is becoming rare, perhaps, to have a nursery inspector a direct appointee of the governor. In many cases a Commissioner of Agriculture is appointed by the governor, and the nursery inspector is appointed by him.

MR. BIGGAR: Is he appointed for a definite period?

MR. FRACKER: I do not know of any state in which the nursery inspector is appointed for any specific period.

CHAIRMAN RUGGLES: The next paper is by T. J. Headlee.

PRESENT STATUS OF THE GIPSY MOTH IN NEW JERSEY[1]

By THOMAS J HEADLEE, PH.D., *State Entomologist, New Brunswick, N. J.*

The speaker can offer as his only excuse for presenting this paper the fact that the attempt to exterminate the present gipsy moth infestation in New Jersey constitutes one of the largest efforts of this kind that has ever been carried out within the limits of the United States. He has attempted to put himself in the place of an entomologist, whose field of endeavor lies in a state far removed from gipsy moth infestation, and to see whether he would, under those conditions, like to know how things are coming on in the effort now being made in New Jersey. It is on the basis of the answer to this question that he has felt that a statement of the situation might meet the wishes of the entomologists here assembled today.

At the close of the dormant season of 1920-1921 the one hundred square mile area reported in the paper entitled "The present status of the gypsy moth in New Jersey" and read before the last annual meeting of this association, had expanded to an area of approximately four hundred and ten square miles. Since that time, although the scouting has gone on through the fall and early winter and has covered approximately 38 percent of the original four hundred and ten square mile area, plus its four hundred and ninety square mile safety border, only one additional township has been found infested, and it can be said that with our present knowledge the area (410 square miles) known last spring has not been materially increased by the scouting.

The work against the gipsy moth up to July 1, 1921 had cost $254,000.00, out of which about $82,000.00 was expended for a more or less permanent equipment of spraying machinery and hose. Of this sum the state of New Jersey furnished $112,000.00, Mr. J. B. Duke $25,000.00 and the United States Government $117,000.00.

[1]For the information of persons who may not be familiar with a paper of the same title read before the Annual Meeting in the year 1920-1921, the writer desires to say that the gipsy moth fighting force in New Jersey is officered by experienced gipsy moth men drawn from New England, that Mr. H. A. Ames is in immediate charge of the work in New Jersey but that his work is done under the direction of Mr. H. L. McIntyre, who is in charge of the field work against the gipsy moth throughout the United States.

TABLE SHOWING EGG MASSES FOUND IN 1920-1921 AND IN 1921-1922

Place	1920-1921	1921-1922
	General Area	
Dukes Park, 1100 acres	3,000,000	51
Plainfield City	4 & 1 ♀ p.	0
Sayreville Township	4 & 2 ♀ p.	0
Westfield Township	1 ♀ p.	0
Balance of the general area	1405 & 106 ♀ p.	?
	Outside Areas	
Deal Beach	201	0
Elizabeth	1	0
Glen Rock or Ridgewood	2 & 1 ♀ p.	?
Madison	2	?
Mendham	1486	10
Paterson	1 ♀p.	?
South Orange	12	0
Wyckoff	4	?

From the above table, as far as the scouting of this fall and early winter has gone within the infested areas, it seems that there has been a very material reduction in the number of egg masses. What the continuance and completion of the 1921-1922 scouting will show is, of course, impossible to say; but if we may take the above figures as an indication, it is to be expected that the first year's work against the gipsy moth will show most excellent results. With one exception, that of Mendham, the outside areas thus far scouted have shown a complete disappearance of the insect.

The total cost of the work in New Jersey for the present year is not apt to be much less than it was last year, because the money which was expended last year in permanent spraying equipment and which this year will not need to be replaced will be taken up in the amount of additional scouting necessary. The work of the present year is supported by $125,000.00 state appropriation. The amount of money which the Government will be able to expend in New Jersey is still a matter of doubt, because the $400,000.00 appropriated by the last Congress for the gipsy moth work in the country is insufficient and of the $600,000.00 requested of Congress for the gipsy moth work for the coming fiscal year $100,000.00 is requested as immediately available. If the $600,000.00 request is granted, the New Jersey problem will probably receive a

minimum of $100,000.00 of Government Funds. The amount of private funds available for the present year is at present uncertain and cannot be reported on.

All things considered it is felt that an excelllent start in the direction of extermination has been made.

CHAIRMAN RUGGLES: We have one paper this morning that is not on the program. I am sure you will be glad to hear from Mr. Borodin who has a message from Russia and we will allow him a few minutes.

THE PRESENT STATUS OF ENTOMOLOGY AND ENTOMOLOGISTS IN RUSSIA

By D. N. BORODIN

American Entomologists have been in close contact with the Russian Colleagues until 1915, but since that time relations have not been re-established. However, in spite of the Chinese Wall surrounding Russia, some news from there is reaching this country.

From a series of letters, which have been received, one may get some idea as to what has become of the Russian Entomologists and in what direction the work is now being carried on. First of all, it will be necessary to present a long list of those Russian workers, who died during the War, revolutions and famine. The majority of American colleagues are undoubtedly familar with the article by Mr. Y. A. G. Rehn, which appeared in the "Entomological News," Vol. XXXII, No. 7, July 1921 and entitled "An Appeal from Russian Fellow Entomologists." It may be well, however, to repeat this list here, supplementing it by a number of additional names.

Adelung, N.	(23. XI. 17)
Alferaki, C. N.	(24. VII. 18)
Bianki, V. L.	(10. I. 20)
Blecker, G. F.	(II. 19)
Bostanjoglo, V. N.	(1919)
Vakoolovsky, N. N.	(1918)
Vassiliev, E. M.	(VII. 19)
Zaroodni, N. A.	(13. III. 19)
Kavrigin, V. N.	(I. I. 19)
Karavaev, B. A.	(1919)
Kroolikovsky, A. K.	(X. 20)
Koordiumov, N. V.	(7. IX. 17)
Meinhard, A. A.	(24. VI. 17)
Oshanin, V. F.	(26. I. 17)
Porchinsky, J. A.	(8. V. 16)

Pylnov, E. V.	(1920.)
Rodzianko, V. N.	(1919)
Romanov, N. M.	(29. I. 19)
Selovsky, M. N.	(1921)
Semonov-Tian-Shansky, R. D.	(27. XI. 19)
Silantiev, A. A.	(21. III. 18)
Smirnov, D. A.	(17. VIII. 20)
Sonotzko, A. A.	(I. IV. 19)
Soovorov, G. L.	(29. IV. 18)
Fisher, E. N.	(1919)
Schreiner, A. E.	(VII. 18.)
Scherbakov, E. S.	(IX. 20)
Kholodkovsky, N. A.	(2. IV. 21.)
Shevyrev, I. J.	(7. VII. 10)
Jacobson, A. T.	(20. VI. 19)
Jacobson, A. A.	(12. XII. 18)

The cause of death of the majority of these Scientists is practically unknown. D. A. Smirnov, A. A. Sonotzko, A. T. Jacobson, and E. V. Pylnov died of spotted typhus fever; I. J. Shevyrev from starvation and N. A. Kholodkovsky from sarcoma cerelrostinae. Out of the total number of members of the Russian Entomological Society, fifty members perished during the period from 1916-1921. Many of the American colleagues will find in this list a number of very familiar names.

Systematic Entomology

Systematic Entomology in Russia was concentrated in Universities and Museums and to a great extent also had amateurs amongst its representatives.

Little is known so far in regard to the progress of this branch of Entomology in Russia and only limited information is on hand relative to some Entomologists:

G. G. Jacobson, Specialist on Coleoptera and Termitae, author of the voluminous, but not as yet completed work, "Coleoptera of Russia and Western Europe," and a comprehensive book, "Orthoptera and Pseudoneuroptera of Russia", is at the present time Secretary of the Entomological Society at Petrograd and works as before in the Zoological Museum of the Academy of Science at Petrograd.

Among other Entomologists working in this Museum are:

A. A. Mordvilko, a well known specialist in Aphididae;

A. N. Kirichenko, specialist in Rhynchota.[1]

A. A. Semenov-Tian-Shansky, specialist in Coleoptera, Hymenoptera and genus Forficula.

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[1]Who is continuing the work of the late V. F. Oshanin.

N. J. Kuznetzov, specialist in Lepidoptera; other Entomologists are also engaged at the Zoological Museum of the Academy of Science.

All these scientists may be addressed: c/o Zoological Museum, Academy of Science, Petrograd, Russia, Via England.

Although completely segregated from the entire scientific world during the last years, they are, nevertheless, continuing the work in these special lines insofar as the conditions of life permit to do so. There were no complaints in the letters received so far as to the hardships and deprivations, but there are constant requests to send separates, journals and books, which they are unable to secure under the present circumstances and a desire to learn whatever new has been discovered and published in the recent years by the men of science abroad.

Entomological Organizations

Among the new Entomological organizations opened in Russia, the following may be mentioned:

The old Bureau of Entomology of the Agricultural Scientific Committee of the Department of Agriculture, formerly in charge of the late J. A. Porchinsky, has been preserved and Dr. V. A. Pospielov is at the head of it now.

Several other Entomological Institutes were opened.

The first joint Congress of Entomologists and Phytopathologists took place in 1918, the second in October 1920, and the third was expected to be in October 1921. It was decided in the first and second Congresses to create joint Entomologo-Phytopathological Institutions, so-called "Stations of Plant Protection," associated with the Experiment Stations.

The new "Stations of Plant Protection" in Russia are as follows:

1. At Petrograd, Chief N. N. Bogdanov-Katkov; collaborators: Prof. M. N. Rimsky-Korsakov (specialist in Hymenoptera, genus Isosoma, Aphanura, genus Embia,) also, A. S. Skorikov (Specialist in Hymenoptera, genus Bombus).

Address: c/o "Station of Plant Protection" (Stantzia Zaschity Rastenii) Petrograd, Russia. Via England.

2. At Ivanovo-Vosnessensk
3. At Cherepovetz
4. At Tambov
5. At Omsk (chief: Mr. Antonov)
6. At Tomsk (chief: Mr. Valov)
7. At Barnaul (chief : Mr. Jurin)
8. At Semipalatinsk (chief: Mr. Hoffman); also in other cities.

All Stations of Plant Protection are united under the Central "Division for Plant Protection" at the People's Commissariat of Agriculture, so-called "Ozra, Narkomzem," which is in charge of A. P. Adrianov, (formerly Chief of the Entomological Bureau of Kaluga).

Preparation of Specialists in Applied Entomology

Two or three special courses were organized at the Universities and Agricultural Colleges of Petrograd and Moscow for training specialists in Applied Entomology. Definite information has been received in regard to such courses at the Petrovsko-Razumovskoye Agricultural Academy (near Moscow) and also at Petrograd.

The course of Entomology is being taught in three sections:

1. Forest Entomology
2. Orchard and Garden Entomology
3. Field Entomology

The lectures in these courses are given by Prof. V. F. Boldyrev, specialist in Biology of Orthoptera, who is assisted by Mr. A. P. Andrianov.[1]

Applied Entomology presents perhaps the best example of what self-denying workers can accomplish along the lines of organization in spite of unfavorable living circumstances.

Publications

We have only a small list of Entomological publications issued during the recent years, but we know that a number of books, reports and a great many popular booklets (pamphlets) of the type of farmers' bulletins in this country have been published to answer the demand of practical needs, which the author of this report has at his disposal.[2]

New Methods of Insect Control

New methods of combating injurious insects presents the application of asphyxiating gases, which were left after the War. These are being used for the destruction of the Asiatic Locust (*Locusta migratoria*) in the deltas of large rivers, such as Volga, covered by thick vegetation consisting of an impassable growth of cane (*Scirpus lacustris*) and inaccessable for the ordinary spraying operations by means of a horse power pump or knapsack sprayer. In such places gases were used with great success. The same substances were used also for the destruction

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[1]The Medical and Veterinary Entomology is concentrated in Colleges and Universities.

[2]Reference of the most important editions issued during the last few years in Russia is printed in the "Review of Applied Entomology," in London.

of Locusts and at the same time Rodentia of the genus Spermophilus, which are abundant in the steppes of South-Eastern Russia.

New poisoned Siberian mixtures are now in use throughout all Siberia.

SUMMARY

1. The work of Entomologists in Russia is being continued in spite of the isolation of that country.
2. Many well known and celebrated Entomologists are participating in this work.
3. They are in great need of scientific Entomological literature published abroad during the years 1915-1921, that is, of books, journals, separates, etc. which they are unable to purchase under existing conditions, but for which they would send in exchange Russian publications.
4. The U. S. Post Offices accept mail for Russia, addressed via England; letters reach Russia without very much delay.
5. Mail from Russia to the the United States is not arriving satisfactorily, but somewhat better at this time.
6. The writer of this report, who represents one of the divisions of the Russian Agricultural Scientific Committee will be glad to impart any information he receives regarding Russian Entomologists upon request from his American colleagues and will also accept for forwarding to Russia any parcels with literature, if such would be found possible to spare for this purpose. It may be directed to the following address: 110 W. 40th St., Room 1603, New York City.

CHAIRMAN RUGGLES: We are all much interested in the entomological problems of Russia, but unfortunately, time will not permit us to discuss them. We now have some business to attend to. The first in order will be the nomination of the Chairman and the Secretary for the Horticultural Inspection Section for next year.

Messrs. Harned and Sasscer were nominated for Chairman and Secretary respectively, and duly elected.

CHAIRMAN RUGGLES: Is there any other business?

MR. SASSCER: I mentioned a moment ago that Mr. J. J. Davis had prepared a very complete and excellent index of the greenhouse insects. So far as I am aware, this is the only manuscript of the kind, and unfortunately, it has not been published although it has been ready for publication for several years. Apparently there is some difficulty in getting some organization to accept it. Inasmuch as we all are,

or should be, interested in greenhouse insects, and all naturally would like to have a ready reference, I move that the Resolutions Committee of the parent association be urged to incorporate in their resolutions a request suggesting that the Society of American Florists publish this paper.

The motion was seconded and carried.

CHAIRMAN RUGGLES: Is there further business?

On the committee to draw up recommendations with reference to greenhouse material, besides Mr. Sasscer, I will appoint H. F. Dietz, T. J. Headlee, Franklin Sherman, Jr., and G. M. List.

If there is no further business, we will stand adjourned.

Adjournment.

NEW EUROPEAN BEE DISEASE THREATENS BEEKEEPING IN AMERICA

Serious ravages causing almost complete destruction of the beekeeping industry in portions of Europe by the "Isle of Wight" disease has started determined action by American beekeepers to save their business from similar losses.

"Isle of Wight" disease is caused by a parasitic mite in adult bees and is easily transported by bees shipped from Europe to America as was proved during the past summer when live bees carrying living mites arrived in Washington from Scotland. Should this disease become established in America, beekeepers, queen breeders and manufacturers of bee supplies would quickly be ruined and horticultural interests would be seriously damaged.

A meeting was called at the Bee Culture Laboratory in charge of Dr. E. F. Phillips of the Bureau of Entomology at Washington, D. C., March 9, which was attended by specialists from several states and Canada who are interested in measures to prevent the introduction of the Isle of Wight disease into the United States and Canada.

Among those at the meeting were Dr. L. O. Howard and Dr. C. L. Marlatt, Chief and Assistant Chief of the U. S. Bureau of Entomology, Dr. E. F. Phillips, Government Apiarist, Prof. F. E. Millen, Apiary Inspector for Ontario.. Canada; Prof. Geo. H. Rea, Pennsylvania State College; E. G. Carr, Apiary Inspector of New Jersey, J. G. Sanders, Harrisburg, Pa., President of the American Association of Economic Entomologists, Prof. N. E. Phillips, Mass. Agric. College, and Dr. H. E. Ewing, Expert on Mites, of U. S. Bureau of Entomology.

The meeting decided to recommend that the U. S. Post Office Department shall at once prohibit the introduction of queen bees through the mails from all foreign countries except Canada, and that a bill be introduced into Congress to prohibit the introduction of adult bees into the United States except for experimental and scientific purposes by the U. S. Department of Agriculture. Since there is no known Isle of Wight disease in Canada, and since it is hoped and expected that the Dominion of Canada will establish the same safeguards to the beekeeping industry, it is planned not to establish any quarantines or prohibitions against shipments of bees from and to Canada.

It was the opinion of all those in attendance that the Isle of Wight disease is such a serious menace to beekeeping on this continent, that every possible step should be taken to prevent its introduction, and that all importations of queenbees should be stopped. Pending full legislation in this matter, it is hoped that beekeepers throughout the continent will cooperate to the fullest degree by making no attempts to introduce adult bees into the country. Any queen breeder who introduced this disease into the country would be doing a great damage to the beekeeping industry, and it would be a serious drawback to his future business.

The committee urges that beekeepers who see any outbreak of any disease of adult bees shall at once send samples for examination and diagnosis to the Bureau of Entomology, Washington, D. C. More detailed information concerning this disease will be presented in a future issue of this journal, and in the meantime information may be obtained by writing to the Department of Agriculture, Washington, D. C., for a copy of Department Circular 218, entitled "The Occurrence of Diseases of Adult Bees'" for free distribution.

J. G. SANDERS, Harrisburg, Pa., Chairman
E. G. CARR, New Jersey.
F. ERIC MILLEN, Guelph, Canada.
Committee.

The Paradichlorobezine Treatment. The control of the California peach borer, *Aegeria opalescens* Hy. Edw. was successful in the counties of Alameda, Santa Clara and San Benito last fall where it was used chiefly on apricot trees. The problem of rootstocks is a new one which must be considered in this state, but as yet no injury has resulted to the ones treated.

An infestation of the pear root aphis, *Eriosoma languinosa* Hartig was completely controlled by the method with no apparent injury to 4 year old pear trees on French roots. The latter experiment is being rapidly enlarged with very interesting results.

E. O. ESSIG

Scientific Notes

Crop Protection Institute Fellowships. In order to promote original research relative to the fungicidal and insecticidal properties of sulphur and the effects of sunlight, temperature and moisture on its action, the Crop Protection Institute expects to offer two fellowships yielding an income of $2500.00 each. Training in chemistry and plant physiology is a prerequisite, and candidates should have demonstrated ability to undertake research efforts of a high type. Applications, accompanied by reprints of scientific articles and letters of recommendations, should be made immediately to the Crop Protection Institute, National Research Council, Washington, D. C. A statement explaining the purposes and scope of the projects and selection of research laboratory may be obtained on application.

W. C. O'KANE,
Chairman
PAUL MOORE,
Secretary

Unusual Infestation of Bulb Mite in Greenhouse. Complaints were received by the Pa. Bureau of Plant Industry from a florist at Malvern, Pa. that a heavy infestation of earthworms was causing great damage to beds of Smilax (*Asparagus medeoloides*) and "asparagus fern" (*Asparagus plumosus*) in his greenhouse during the present season. Samples of plants examined showed a much-stunted condition of the roots and a soft rot of the tubers with lesions which penetrated the outer skin into the tender tissues of the apparently healthy roots. Sciarid larvae were present, but close examination with the binoculars revealed the presence of numbers of large, palecolored, sluggish mites, particularly about the crown of the plants, where they were found in largest numbers by parting the fibers of the half decayed roots. Cavities in healthy roots which were hardly visible to the unaided eye were found in most instances to contain several of these mites, apparently feeding on healthy tissues. From balsam mounts made of specimens collected they were determined by Dr. H. E. Ewing of the U. S. National Museum as *Rhizoglyphus* sp., apparently *hyacinthi* Boisd.

In that this mite has not been recorded as a pest of these hosts and that it is very generally distributed in this greenhouse, causing a large reduction in the season's cut, its possibilities as an important pest should not be overlooked.

J. K. PRIMM,
Oak Lane, Pa.

Notes on Orchestes rufipes. The work of this insect has been under my more or less superficial observation near Salt Lake City, Utah, since 1914. However it was only late in the fall of 1920 that I observed the adults issuing from mines in willow leaves and completely devouring the green substance of infested willows.

As soon as the leaves appeared on the same willows in the spring I found the adult beetles destroying the young leaves and mating. Once a month during the summer I have made notes in the same locality and found the adults always feeding and mating. The attack was confined to *Salix fendleriana* and *Populus angustifolia*. Early in the summer dark blotches appeared on the willow leaves suggesting that larvae were at work. The poplar leaves were not similarly blotched and there were no larvae in the willow blotches. Apparently the discolored area surrounding feeding punctures was due to bacterial infection.

Upon making an observation on the 30th of September I found the willow leaves over quite a large area practically all killed and blackened. Adult beetles solidly covered the under surfaces of the remaining green leaves. They were also attacking the poplar, the narrow leaved willow, *Salix exigua*, a third species of willow, *Salix schouleriana*, and a birch, *Betula fontinalis*. From the mines in the willow leaves I was able to obtain only adult beetles, apparently on the point of emerging, and certain parasites. From the poplar leaves I obtained several larvae, pupae and parasites.

There seems to have been a decided increase in the severity of the attack since the first observations were made and the colony seems to be growing very rapidly.

WYATT W. JONES
Salt Lake City, Utah

On the extra instar of the Chinch bug. Subsequent to the appearance of my paper entitled "Bionomics of the Chinch bug" Bul. 1016, I have learned that the extra instar of this insect was previously discovered by Dr. Yuasa of the University of Ill. and was made note of in the *Ent. News* (Vol. 29, pp. 233-234, 1918). It is needless to say had the writer known of Dr. Yuasa's discovery at the time the paper was written that gentleman would have been given full credit.

PHILIP LUGINBILL,
U. S. Bureau of Entomology, Washington, D. C.

Destructive Bark-Beetles in the Monterey Pine Forests. During the last few years, the Del Monte Properties Company which controls most of the pine forests in the vicinity of Pebble Beach, California, has been thinning out the grove. Unfortunately most of the felled timber was allowed to remain in the forest, either as corded wood, poles or trash, with the result that various species of bark beetles were able to develop to an enormous extent. Last year the cutting stopped and in consequence the beetles overlapped into the standing timber, causing a great deal of damage. The red turpentine beetle, *Dendroctonus valens* Lec. was responsible for the death of a few of the larger trees but most of the damage was done by *Ips plastographus* Lec. and *Ips radiatae* Hopk. with one of the species of *Pityophothrus* causing the death of a few of the smaller trees. The company now has a large force of men at work cleaning up the area so that future damage will no doubt be minimized.

EDWIN C. VAN DYKE

Zoological Record. Owing to the collapse of the International Catalogue of Scientific Literature in connection with which the *Record* was published from 1906 to 1914, the Zoological Society of London has undertaken to bear the whole financial responsibility for the preparation and printing of the *Record*.

Owing to the great increase of the cost of printing and to the very meagre support accorded to the *Record* by Zoologists and Zoological Institutes generally, the financial burden of this undertaking on the Zoological Society is becoming very severe. The cost of printing the *Record* now amounts to between £1500 and £2000 annually and the Society receives back by Subscribers and sales less than 25% of this sum; I fear therefore, unless Zoologists are prepared to make greater efforts to support the undertaking there is a strong possibility that the Council of the Zoological Society may refuse to find this large sum each year.

It appears therefore to be the duty of every Zoologist to help so far as he is able to support this most invaluable work. All particulars and forms of subscription can be obtained from the Secretary of the Zoological Society, Regents Park, London, N. W. 8. It may be mentioned that the price of the whole volume is now £2.10. 0. and the price of the separate parts a proportional smaller sum; that of the portion Insecta is 15/—.

V. S. SCLATER
Editor *Zoological Record*

The European Red Mite In California. The so-called citrus red spider, *Tetranychus citri* Mc Gregor (*T. mytilaspidis* Riley), which occurs abundantly in the citrus orchards of Southern California and in the deciduous fruit orchards of California, Oregon and Idaho proves to be the European red mite, *Paratetranychus pilosus* C. & F., recently reported from Connecticut by Dr. Philip Garman. The western species has been submitted to Dr. Philip Garman, Dr. H. E. Ewing and others and there seems to be little doubt in the conclusions reached by the best authorities on the subject.

In the deciduous fruit orchards of the West this mite bids fair to be as serious as it is in the citrus orchards.

It probably has a very wide distribution throughout the United States because of the ease of carrying the eggs on nursery trees. The small round red eggs are decidedly flattened, minutely striated and usually furnished with a small stalk so admirably illustrated on page 357, Vol. 14, No. 4, JOURNAL OF ECONOMIC ENTOMOLOGY, Aug. 1921, by Dr. Garman.

E. O. ESSIG

The Miller Memorial Beekeeping Library. The death of Dr. C. C. Miller of Marengo, Illinois, made a gap in the beekeeping ranks in the United States and throughout the world which will be hard to fill. With his high ability as a beekeeper, Doctor Miller possessed such rare qualities as a man that he was revered by beekeepers as few if any have been. On his death there were many suggestions of ways to honor his memory, and a volunteer committee of five has undertaken this. It was thought best not to undertake anything which would involve the raising of a large sum. The committee has decided to raise whatever could be obtained without too great sacrifice and to establish a permanent endowment for a library of beekeeping in some one of the leading colleges or universities in which beekeeping is taught, to supplement the library purchases of the college itself. Such a memorial will in a sense go on doing what Doctor Miller did so well during his life, namely to be of help to beekeeping. It is greatly to be preferred to a pile of granite as a memorial fitting to a man of his type.

Since there is as yet no library in the country in which there is sufficient of the beekeeping literature to be fully helpful to the investigator, the establishment of such a library will be an important addition to our facilities, wherever it may be established. The purpose of this note is frankly to enlist the support of entomologists in this movement, and to suggest that many will wish to add something to the fund. Contributions of any size will be gratefully received, and should be sent to the chairman of the committee, Mr. C. P. Dadant, Hamilton, Illinois.

E. F. PHILLIPS,
Bureau of Entomology, Washington, D. C.

Mealy Bug Control on Pear Trees. A considerable amount of work is being done on the control of Baker's mealy bug, *Pseudococcus maritimus* Ehrh., which in some orchards is a serious pest of pear trees, of which the Winter Nellis is most injured, although other varieties are also attacked. During the dormant season the mealy bugs and egg masses occur in quantities in crevices and under the rough bark and on the undersides of the smaller limbs.

After first scraping away much of the loose bark on the trunks and bases of the main limbs, the trees are thoroughly sprayed with miscible oil or crude carbolic acid and distillate emulsion. The latter is no better than the miscible oil, but when prepared at home is very much cheaper. The formula recommended is as follows

Stock Solution

Whale oil soap	40 pounds
Crude Carbolic acid (25%)	5 gallons
Distillate (28 Baume)	10 gallons
Water to make	50 gallons

First dissolve soap in 10 to 15 gallons of hot water; add crude carbolic acid and distillate and remainder of water. Boil 20 minutes. For use dilute one part of above to 20 parts of water.

In cases of serious infestation three applications are being made during January and February.

E. O. ESSIG

Curly Leaf Transmission Experiments with Beet Leafhopper (*Eutettix tenella* Baker), Summary.

The beet leafhopper when it hatches from the egg is non-infective.

Curly leaf is not transmitted through the seeds from "stechlinge" affected with the disease before and after transplanting.

We have failed to demonstrate up to the present time that the beet leafhopper is a mechanical carrier of curly leaf, or a mechanical carrier in mass infection of a beet.

The minimum incubation period of the infective principle of curly leaf in the beet leafhopper required four hours at the following temperatures: maximum 103° F.; minimum 94° F. and mean 100° F. and three days in the sugar beet at the following temperatures; maximum 103° F.; minimum 57.7° F. and mean 80.3° F.

Beet leafhoppers which had been fasted and then the mouth parts contaminated with *Bacillus morulans* isolated from curly leaf beets or when allowed to puncture the bacteria into the tissue, rubbed on a portion of a beet leaf, failed to transmit the disease.

Daily inoculations of juice from beets, upon which infective beet leafhoppers had fed from 1-8 days or until the earliest symptom of curly leaf appeared, failed to produce the disease in healthy beets. Juice exuding from curly leaf beets in the field when incoluated into healthy beets also gave negative results. The excrement of infective beet leafhoppers inoculated into the petioles of healthy beets failed to produce curly leaf. The disease did not develop when healthy leaves were rubbed with crushed curly leaf foliage. We have failed to obtain a single case of curly leaf up to present time by inoculating various internal organs from infective beet leafhoppers vivisected in physiological salt solution (.8% normal) and in sap pressed from healthy beets.

HENRY H. P. SEVERIN, PH.D.,
Calif. Agr. Exp. Station.

ANTI-MOSQUITO CONVENTION

The ninth annual meeting of the New Jersey Mosquito Extermination Association was held at the Hotel Chalfonte, Atlantic City, New Jersey, March 1-3, 1922. The meeting was well attended by mosquito control workers from New Jersey and various sections of the country. The meeting was called to order Wednesday March 1, at 8 P. M., by President Charles Lee Meyers of Jersey City. Mr. Meyer's opening address entitled "Industrial Results of Mosquito Control" brought out several points that are of great economic importance. Mr. Robert T. Engle of Beach Haven, President Ocean County Mosquito Commission read the next paper, "Resort Development as a Result of Mosquito Control."

The second session, March 2, 10:00 A. M., was given up to reading and discussing papers as follows—: "Effective and Practical Methods of Mosquito Control Work, by Russell W. Gies, Chief Inspector, Union Co., N. J.; "The Need For, The Method of Carrying On, and The Results of Locally Supported Campaigns," by Jesse B. Leslie, Chief Inspector, Bergen Co., N. J.; "Women's Part in Mosquito Control Work," by Mrs. Peter C. Olsen, President Womens Club, Perth Amboy, N. J.; "The Problem of Evaluating Mosquito Density and the Advantages to be Gained from Its Solution," by Dr. Thomas J. Headlee, State Entomologist, New Brunswick.

Third session, Thursday, March 2, 2:00 P. M. Mr. Joseph A. LePrince, Senior Sanitary Engineer, U. S. Public Health Service, gave an interesting talk on "Important Phases of Anti-Mosquito Work of the United States Public Health Service," followed by Dr. L. O. Howard, Chief Bureau of Entomology of the United States Department of Agriculture, "Recent Results in Anti-Mosquito Work of the Bureau of Entomology, Featuring Results of Experiments Carried on at Mound, La." A recently produced motion picture of great educational value, entitled "Warfare Against the Mosquitos of New Jersey," was shown at the conclusion of this session.

At the fourth session, Thursday March 2, 8:00 P. M., Mr. Peter H. Woodford, General Passenger Agent, Long Island Railroad Company, delivered an address entitled "Need For, The Solution of the Problem, and the Hoped For Results of Mosquito Control." The rest of the session was given up to the reading of papers, as follows:—"Recent Developments in Mosquito Control Work in Greater New York," by Eugene Winship, Department of Health, City of New York; "Connecticut," by Samuel T. Sealy, Connecticut Agriculture Experiment Station, New Haven, Conn.; "Nassau County, N. Y., " by William H. DeMott, Chief Inspector.

At the fifth session, Friday March 3, 10:00 A.M., papers entitled: "Presentations of New and Unusual Features of County Mosquito Control Work in 1921," were presented by the representatives of the active mosquito commissions in New Jersey, as follows:—Atlantic County by Fred A. Riely, Superintendent; Bergen County by Dr. Lewis W. Brown, Commissioner; Cape May County by William Porter, Commissioner; Essex County by James E. Brooks, Consulting Engineer; Hudson County by Lewis E. Jackson, Executive Secretary; Middlesex County by Lewis E. Porter, Commissioner; Monmouth County by Dr. G. Van Voris Warner, Treasurer; Ocean County by Dr. Frank P. Brouwer, Commissioner; Passaic County by Walter R. Hudson, Commissioner; Union County by Dr. R. G. Savoye, Commissioner; followed by "Summary of County Work" by Wilbur M. Walden, Assistant Entomologist, New Jersey Agricultural Experiment Station, New Brunswick.

The following officers were elected for the ensuing year: President Wilfred A. Manchee, Newark; First Vice-President W. H. Randolph, Rahway, Second Vice-President Dr. Julius Way; Secretary T. J. Headlee, New Brunswick; Assistant Secretary, Wilbur M. Walden, New Brunswick; Treasurer Lewis E. Jackson, Jersey City.

S. T. SEALY

JOURNAL OF ECONOMIC ENTOMOLOGY

OFFICIAL ORGAN AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS

APRIL, 1922

The editors will thankfully receive news matter and other items likely to be of interest to our readers. Papers will be published as far as possible in the order of reception, except that papers of reasonable length may be accepted in the discretion of the editor for early publication, provided that at least 100 reprints be ordered at full price rates; in the case of other matter, the maximum of 2,500 words is still operative. Photo-engravings may be obtained by authors at cost.

Separates or reprints, if ordered, when the manuscript is forwarded or the proof returned, will be supplied to authors at the rates given below. Note that the number of pages in a reprint may be affected somewhat by the make-up, and that part of a page is charged as a full page. Carriage charges extra in all cases. Shipment by parcel post, express or freight as directed.

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The imperious demands of war in recent years resulted in the laying hold of the exceedingly diversified knowledge classed as science, and its utilization for the advancement of specific purposes, most worthy, many tending very strongly in the opposite direction. The National Research Council has accomplished much in recent years in bringing the diverse or to a certain extent isolated sciences into fruitful relations one with the other to the mutual advantage of both and the very great gain of the nation as a whole. The leaven has been working gradually throughout the lump and many Entomologists have come within the sphere of beneficent action. First an organic connection was established between the Association and the Council. This was followed by the creation of a Crop Protection Institute, an organization designed especially to develop cooperative work along practical lines. The cooperative dusting projects of last year are a typical line of activity. A most important advance step has been taken in securing the recently announced cooperation of several sulphur companies in a fundamental study of the insecticidal and fungicidal properties of sulphur. These are new departures and may be regarded as significant of the trend of the times. We may expect in the near future more effective productive, cooperative or team work among scientists and there is a possibility of less emphasis being placed upon the work of the self-centered specialist with comparatively little appreciation of anything outside his important problem or problems.

Current Notes

Mr. Arthur Gibson, Dominion Entomologist of Canada, was ill for two weeks with bronchitis during the latter part of January.

Dr. W. E. Hinds, Alabama Agricultural Experiment Station, Auburn, Ala., visited the Bureau of Entomology during the latter part of February.

Professor Vernon L. Kellogg, who is now secretary of the National Research Council, has been elected a Trustee of the Rockefeller Foundation.

Professor W. C. O'Kane spoke before the New Haven members of the Appalachian Club of New Haven, on the evening of January 28.

The degree of Doctor of Philosophy was conferred on J. D. Tothil of the Canadian Entomological Branch, by Harvard University, early in February.

Mr. H. A. Gossard of the Ohio Station was ill from rheumatism the latter part of January, and was confined to his bed for several days.

Mr. George A. Maloney of the Boll Weevil Laboratory, Bureau of Entomology, delivered an address on boll weevil control before the Rhode Island Textile Manufacturers at Providence, on January 21.

Mr. R. Heber Howe, Jr., was recently the recipient of the degree of Master of Arts from Harvard University. He has also been appointed one of the coaches of the crew at Harvard.

Dr. E. P. Felt and Mr. A. F. Burgess were speakers at a tree protection institute, held at the Agricultural Experiment Station, New Haven, Conn., on February 21. About 70 were in attendance.

According to Official Record of the U. S. Department of Agriculture, Mr. George D. Smith of the Bureau of Entomology has resigned as entomological assistant to accept a position with the Florida Agricultural Experiment Station.

Mr. Quincy S. Lowry, Assistant Director of the Division of Plant Pest Control, Massachusetts Department of Agriculture, visited Washington, New York and New Haven on a brief vacation in March.

Mr. A. F. Burgess and Professor W. C. O'Kane addressed the eleventh annual meeting of the Massachusetts Tree Wardens and Foresters Association held in Horticultural Hall, Boston, March 8 and 9.

Mr. H. G. Crawford of the Canadian Entomological Branch, left Ottawa February 9, on annual leave, and expected to visit the European corn borer laboratory at Arlington, Mass., maintained by the U. S. Bureau of Entomology.

Mr. J. R. Douglass, scientific assistant of the Bureau of Entomology and assigned to the force of N. F. Howard, Birmingham, Ala., has resigned to take up vocational training in entomology at Cornell University, Ithaca, N. Y.

A new motion film showing details of the methods of controlling the boll weevil by dusting with calcium arsenate has recently been completed by the U. S. Department of Agriculture, and will be released shortly.

Mr. A. G. Dustan of the Canadian Entomological Branch, left the Fredericton, N. B. laboratory on January 7, to continue at MacDonald College his investigations on the diseases affecting the apple sucker and the green apple bug.

Prof. A. G. Ruggles, State Entomologist of Minnesota and Prof. W. H. Brittain, Provincial Entomologist of Nova Scotia, spent January 2, at headquarters at Ottawa, looking over the organization of the Branch and meeting members of the Staff.

According to the *Florida Entomologist*, Dr. H. S. Davis, professor of zoology, including entomology, University of Florida, and a charter member of the Florida Entomological Society, has resigned to accept a position in the U. S. Bureau of Fisheries.

Dr. A. L. Quaintance of the Bureau of Entomology has returned from a trip to New Orleans, La., and Bentonville, Ark., where he conferred with men in charge of the Bureau's laboratories at these places regarding work under way.

Mr. O. I. Snapp of the Bureau of Entomology, gave addresses on peach insects before the Tennessee State Horticultural Society, at Nashville, Tenn., January 24-26, and the Association of Southern Agricultural Workers, at Atlanta, Ga., February 21-23.

Dr. L. O. Howard attended the ninth annual convention of the New Jersey Mosquito Extermination Association at Atlantic City, N. J., March 1 and 2, and gave an address on "Recent Results of the Anti-Mosquito Work of the Bureau of Entomology."

According to *Science*, Professor C. F. Curtis Riley of the department of zoology of the University of Manitoba, who is carrying on investigations on the ecology and behavior of the Hemipterous family Gerridae, has been elected a member of the Zoological Society of Tokyo, Japan.

Mr. E. H. Strickland has resigned from the Entomological Branch, Canadian Department of Agriculture, to accept a position as professor of entomology in the University of Alberta. Mr. Strickland joined the Branch in 1913 and returned to it after service over seas in 1919. His resignation takes effect March 31, 1922.

A conference on combating the Japanese beetle in New Jersey and Pennsylvania was held by the Bureau of Entomology February 21. Professor J. G. Sanders, Director of the Pennsylvania Bureau of Plant Industry, Harrisburg, Pa., Dr. T. J. Headlee, State Entomologist, New Brunswick, N. J., and C. H. Hadley, Riverton, N. J., were present.

According to *Science* leave of absence has been granted a party of naturalists from the State University of Iowa to spend the summer of 1922 in the Fiji Islands and New Zealand. Professor C. C. Nutting is zoologist, and will act as leader. Assistant Professor Dayton Stoner is entomologist and ornithologist and Mrs. Dayton Stoner is assistant entomologist.

Mr. George E. Sanders, who has been in charge of the insecticide investigations of the Entomological Branch, Canadian Department of Agricultulture, with headquarters at Annapolis Royal, N. S., resigned the latter part of January, to accept a position with the Dosch Chemical Company with headquarters at Louisville, Ky. Mr. Sanders has been connected with the Canadian entomological staff since 1910.

The following appointments have been announced by the Bureau of Entomology: Troy Thompson, temporary field assistant on the force of K. L. Cockerham, Biloxi, Miss., and has been stationed at Van Cleve, Miss., sweet potato weevil eradication; Otto D. Link, temporary field assistant, under B. L. Boyden, Daytona, Fla., and stationed at Macclenny, Fla., sweet potato weevil eradication; L. W. Brannon, D. M. Dowdell, Jr., and H. B. Lancaster, probationary appointments as junior entomologists.

The Rev. Thomas W. Fyles, D. C.L., F.L.S., of Canada, died August 9, 1921, at Ottawa, where he had resided since 1912. He lived at Levis for some twenty-five years, where he was employed by the Society for the Promotion of Christian Knowledge, as immigration chaplin. Dr. Fyles published many entomological papers in *Canadian Entomologist* and in the *Reports of the Ontario Entomological Society*, of which he was president from 1899 to 1901.

Mr. F. C. Bishopp of the Dallas, Tex., laboratory, Bureau of Entomology, following attendance at the Toronto meeting, visited several points in New York in connection with the ox-warble work being done in that State. Coming on to Washington he spent a few days conferring with various Department officials on phases of the work on investigations of insects injurious to animals. He then returned to Dallas, making a few stops *en route* to investigate ox-warble conditions.

According to *Science* Professor William M. Wheeler, dean of the Bussey Institution, Harvard University, will give a course of lectures at the Lowell Institute, Boston, on "Social Life Among Insects." Dates and subjects are as follows:—February 27, "A Comparison of Animals and Human Societies. The Social Beetles." March 2, "Wasps, Solitary and Social." March 6, "Bees, Solitary and Social." March 9, "Ants, their Development, Casts, Nesting, and Feeding Habits." March 13, "Parasitic Ants, and Ant Guests." March 16, "Termites, or White Ants."

Clarence F. Mickel of Lincoln, Nebraska has taken up his work at Minnesota as a graduate student and as assistant in economic entomology, His family will come later in the month after he has had time to locate living quarters. Mr. Mickel is a graduate of the University of Nebraska with the class of 1917. For two years he was extension entomologist at the University of Nebraska and after his return from war service he was research entomologist with the American Beet Sugar Company at Rocky Ford, Colorado.

Dr. Paul B. Lawson of the University of Kansas will again give the courses in Elementary Economic Entomology in the summer session of the University of Minnesota. At the close of the session Dr. Lawson will join Dr. H. B. Hungerford, Dr. H. H. Knight and Mr. W. E. Hoffman in an entomological field trip to the northern section of Minnesota. It is hoped that several other entomologists interested in this practically unworked fauna may join the party.

The annual conference of Hessian fly workers of the branch of Cereal and Forage Insect Investigations was held at Carlisle, Penn., on January 2. The following persons were in attendance: W. R. Walton and Joe S. Wade, Washington, D. C.; W. H. Larrimer and W. B. Cartwright, West Lafayette, Ind.; J. R. Horton, Wichita, Kans; A. F. Satterthwait, Webster Groves, Mo.; G. G. Ainslie, Knoxville, Tenn.; W. J. Phillips, Charlottesville, Va.; L. P. Rockwood, Forest Grove, Oreg; and P. R. Myers, C. C. Hill, and H. D. Smith, Carlisle, Penn. It was the unanimous opinion of those present that the conference had attained valuable results and that similar conferences should be held annually in the future.

The third general conference of the Entomological Branch Staff was held in Ottawa on January 3, 4, and 5. In addition to the officers stationed at Ottawa, the following were in attendance at the meetings: Mr. Sanders of Nova Scotia, Mr. Tothill of New Brunswick, Mr. Petch of Quebec, Messrs. Ross and Hudson of Ontario, Mr. Criddle of Manitoba, Messrs. Strickland and Seamans of Alberta, and Messrs. Hopping and Downes of British Columbia. The conference was opened by the Deputy Minister of Agriculture, Dr. J. H. Grisdale, who welcomed the outside men to Ottawa, and stated further that he hoped that as a result of the meetings, the Branch would be in a better position to formulate schemes for combating insect pests. Dr. Grisdale also attended several other sessions of the conference.

The brown-tail moth scouting work in the Providence of New Brunswick was completed the latter part of January and no winter nests of this insect were found. Up to January 28, 757 nests of the brown-tail moth were collected in Nova Scotia, the majority of these being found in the Bridgetown, Round Hill and Torbrook dis-

tricts. Local outbreaks have occurred at all the above localities within the past few years. Inspector Cameron examined the corn on exhibition at the Ottawa Fair on January 17 to 21. Owing to the large number of exhibits of corn on the cob at the Chatham Fair, Mr. W. L. Oliver of Port Stanley, Ont., was appointed to assist Mr. Hudson in this work. A total of 11,330 ears of corn were examined. All corn originating in the quarantined area was returned to that area at the close of the show.

A course of six lectures to be given in Chipman Hall, Tremont Temple, Boston, on Saturday afternoons at 2:30 o'clock has been arranged by the Cambridge Entomological Club. These lectures are to be illustrated with lantern slides and motion pictures, and the subjects, speakers and dates are as follows: February 18, L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture. On the work of the Bureau with special reference to the Gipsy Moth and other injurious insects, of local interest. February 25, Wm. T. M. Forbes of Cornell University, On some Habits of Wasps and their relatives. March 11, C. T. Brues, Professor of Entomology at Harvard University On Mosquitoes and other insects as carriers of disease. March 18, Miss Edith M. Patch, Entomologist of the Maine Agricultural Experiment Station. On the Seven Lives of an Elm Aphis, *Eriosoma lanigera*. March 25, J. H. Emerton, On the Spiders, their structure, habits and relations to Insects.

About February 1, 1922, Messrs. S. S. Crossman and Dr. John N. Summers of the gipsy and brown-tail moth investigations, Bureau of Entomology, left this country to take up parasitic work in Europe and Japan respectively, in continuation of work along this line which was interrupted by war conditins. Prior to the war, parasites from abroad were received in this country and were propagated and disseminated throughout the area infested with the gipsy and brown-tail moths. Many of the species imported were successfully established and it was purposed to continue the work of importing, studying and colonizing in the field all species of parasites which were found to aid in the control of the two pests in their native homes. The outbreak of the world war prevented a continuation of this effort. It is believed that much benefit will be derived from further work abroad in importing beneficial parasities to aid in control in this country. A number of species which were imported prior to the interruption of this work did not become established for various reasons, some of which are not well understood at this time. It seems certain that some of these species may be established if study is continued and earnest effort made through foreign work by scientists experienced in moth investigations in this country. M. Crossman will visit Portugal, Spain, Italy, Austria, Czecho-slovaka, France and Germany in an endeavor to supplement the information which we now have regarding the gipsy and brown-tail moths in their native homes, as well as the parasites which attack them. Dr. Summers will visit the localities in Japan which promise the greatest results.

Mr. Harry L. Parker, attached to the corn-borer investigations, Bureau of Entomology, formerly located at Arlington, Mass., sailed for France on January 17 for the purpose of assisting W. R. Thompson in the collection and shipment of parasites of the corn borer from France to the United States. Mr. Parker's address will be: European Parasite Laboratory, Domaine du Mort Fenouillet, Hyeres, Var, France.

The eighth annual meeting of entomological workers in Ohio Institutions was held February 3, 1922, in Room 109, Botany and Zoology Building, Ohio State University, Columbus, Ohio. The following program was presented: F. H. Krecker,

Emergence of a May-fly from its Nymphal Skin under Pelagic Conditions; A. E. Miller, Problem of a Collector; C. H. Waid, Observations on the Potato Leafhopper; T. H. Parks, Experiments and Demonstrations in the Control of Potato Leafhoppers and Hopperburn; E. W. Mendenhall, Observations on the European Corn Borer; W. C. Kraatz, A New Feeding Habit of a Dermestid Larva; Herbert Spencer, Aphid Parasites and Hyperparasites; C. R. Cutright, Relative Efficiency of Some Aphid Predators; R. C. Osburn The Tabulation of Specific Characters of Insects; Miss Mary Auten, Insects Associated with Spider Nests; D. M. DeLong, The Genus Deltocephalus, Some Notes on the Ecology and Distribution of the North American Species; H. L. Dozier, Male Genitalia of Delphacids; T. G. Phillips, The Chemistry of some Common Insecticides; H. A. Gossard, Hessian Fly Emergence at Sandusky, Ohio, in 1921; M. B. Jimison, Three Years of Hessian Fly Control Work in Erie County, Ohio; J. T. Potgieter and T. J. Naude, Economic Entomology in South Africa; E. C. Cotton, Notes of the Year on Inspection Work; J. W. Bugler, Control of some Greenhouse Insects; W. V. Balduf, Parasites of the Cucumber Beetle; J. S. Hine, Syrphidae Common to Europe and America; H. E. Evans, Observations on San Jose Scale in Southwestern Ohio; C. H. Kennedy, The Origin of Put-in Bay Dragon Fly Fauna; J. S. Houser, The Apple Flea Weevil; C. R. Neiswander and R. F. Chrisman, Hibernation Responses of the Asparagus Beetle. Visitor from out of state, W. H. Larrimer, Lafayette, Ind. The following officers were elected for 1922: President, T. H. Parks; Vice-President, J. S. Hine; Secretary, W. V. Balduf.

Apicultural Notes

The regular year's course in beekeeping at the University of Tennessee has fifteen students.

The American Honey Producers' League held its annual meeting at Salt Lake City, January 30 and 31.

Dr. E. F. Phillips, Bureau of Entomology, spoke on beekeeping at the Madison Square Garden Poultry Show, New York City, on January 26.

Mr. George H. Rea, formerly extension specialist in Beekeeping in New York, has resigned to take up similar work at Pennsylvania State College.

The State Inspector of Apiaries, who has his headquarters in the Office of the State Entomologist, University of Tennessee, Knoxville, is James M. Heatherly.

Fifty-six delegates and members attended the third annual meeting of the American Honey Producers' League at Salt Lake City on January 30 and 31.

Dr. E. F. Phillips will deliver one of the Ludwick Lectures of the Philadelphia Academy of Natural Sciences on April 3. Subject: "Bees and Beekeeping."

Mr. N. E. Phillips, Assistant Professor of Beekeeping at the Massachusetts Agricultural College, recently spent some time at the Office of Bee Culture, Bureau of Entomology.

The annual meeting of the stockholders of the Colorado Honey Producers' Association, was scheduled to take place at the Auditorium Hotel, Denver, March 6 and 7.

Mr. A. E. Lundie, of the Union of South Africa, a graduate student in Entomology at Cornell University, is spending some time at Washington in the Bee Culture Laboratory.

The Beekeepers of East Tennessee will have a meeting during the first week in April at Knoxville, Tennessee. This Association has a membership of 108 and is four years old.

The present officers of the Tennessee Beekeepers' Association are G. I. Matthews of Franklin, Tennessee, President; Miss Elizabeth Morris of Cedar Hill, Tennessee, Vice-President; and G. M. Bentley of Knoxville, Secretary-Treasurer.

The officers of the East Tennessee Beekeepers' Association are G. M. Bentley of Knoxville, President; G. F. Vineyard of 2414 Magnolia Avenue, Knoxville, Vice-President; and Hamilton Steele of Rogersville, Tennessee, Secretary-Treasurer.

Messrs. J. B. Bateman and Winifred S. Hull have been appointed as temporary assistants in the Bee Culture Laboratory, Somerset, Md., to assist in temperature readings on colonies of bees to be taken throughout the active season.

The Vocational Department of the University of Tennessee which has a two year's course in beekeeping, at present has a registration of fifteen students. Three of these Vocational students will be rehabilitated next month and have made arragements to start commercial beekeeping in Tennessee.

A motion picture film: "Bees: How they live and work," taken at Somerset during last summer, was recently released by the Motion Picture Laboratory of the U. S. Department of Agriculture. A second reel giving beekeeping practices for a season will soon be complete.

Warning has been sent out to the beekeepers of Tennessee to feed any weak colonies. The present winter has been a very mild one and bees have been active more or less all winter, which has caused a heavy drain on the stores for brood rearing.

Many requests are coming to the State Entomologist for the formation of a West Tennessee Beekeepers' Association. This will more than likely be perfected this spring. The Commercial Club of Memphis has extended an invitation for the initial meeting to be held at Memphis, using the Club Rooms for headquarters.

The Tennessee State Beekeepers' Association held its annual convention in Nashville, Tennessee, on January 26. The convention was attended by about 150 apiarists from this and nearby states. A splendid exhibit of bee supplies was made by the leading supply firms. The membership of the Association is 115. This Association is eight years old. The program follows:—Thursday, January 26, 1922, President's Annual Address, Floyd C. Brilliar, Madison; Report of Secretary-Treasurer, G. M. Bentley, Knoxville; Beekeeping as an Avocation, Rev. R. E. Wright, Wartrace; How I Became a Commercial Beekeeper, W. R. Walling, Hardin, Monrana; Advantages of Modern Equipment, Jere C. Frazer, Memphis; Queens, John M. Davis, Columbia; My Method of Introducing Queens, J. M. Buchanan, Franklin; Foul Brood Control, James M. Heatherly, Knoxville; Extracted vs. Comb Honey, Open Discussion by Members; Address, E. R. Root, Editor, Gleanings in Bee Culture, Medina, Ohio; Activities of the American Honey Producers' League, H. B. Parks, Secretary, San Antonio, Texas; Report of Toronto Meeting, G. M. Bentley, Knoxville.

At the Toronto meeting of the American Association of Economic Entomologists the section on apiculture appointed a committee consisting of S. B. Fracker, Chairman and Messrs. George H. Rea, of Pennsylvania, C. B. Gooderham, of Ottawa, to devise means for the protection of the United States and Canada against the introduction of the Isle of Wight disease. At that time the mite (*Acarapis woodi*), which causes the disease was known only in the British Isles but it has since been discovered on the continent of Europe and has come through the mails in a shipment from Scotland to Dr. E. F. Phillips, United States Bureau of Entomology.

The committee in correspondence determined to confine their activities to the securing of legislation against the introduction of bees from outside the United States.

They also presented the situation to the American Honey Producers' League at the Salt Lake City Meeting in February and resolutions were passed by the League favoring a quarantine action. Later developments are given on a preceding page.

Pacific Slope News

Professor S. B. Freeborn has undertaken some important poultry parasite investigations at Petaluma, California.

Mr. G. A. Coleman, apiculturist, attended the annual meeting of the State Beekeepers' Association at Visalia, in February.

Professor R. H. Smith, State Entomologist of Idaho, was a visitor at the Department of Entomology, University of California in January.

Mr. Frank B. Herbert, formerly with the Forest Insect Investigations of the United States Department of Agriculture, is with the Balfour Guthrie Company with address at San Jose, California.

Mr. D. L. Currier, formerly County Horticultural Commissioner of San Benito County, California, has accepted the position of entomologist for the San Jose Spray Company, with headquarters at San Jose.

Miss Therese Beckwith, a graduate in entomology from Stanford University in 1921, has been appointed Departmental Technician in Entomology at the Oregon Agricultural College. She will have charge of the departmental collection, library and files.

Director S. B. Doten of the Nevada Agricultural Experiment Station was a visitor at the University of California in January to confer with Dr. H. P. Severin on the curly leaf situation at Fallon, Nevada.

Professor Asa Maxon of the Great Western Sugar Company, Longmont, Colorado, called on Dr. H. P. Severin, University of California, to talk over the field investigation on the beet leafhopper which the latter has conducted the past few years in California.

Professor W. B. Herms, head of the Division of Entomology and Parasitology, University of California, has just directed the completion of a moving picture film on the general subject of Malaria. The film is complete in every detail and has been received with great appreciation wherever shown.

Mr. J. D. Neuls, formerly of the Bureau of Entomology, is now with the Pacific Platinum Works, 229 East 9th Street, Los Angeles, California. Mr. Neuls formerly specialized in hydrocyanic acid gas fumigation and has considerable unpublished fundamental data. He will be glad to help any one investigating fumigation problems.

Mr. Ralph H. Smith, Station Entomologist of Idaho, with headquarters at Twin Falls, has accepted a position with the California Central Creameries as Research Entomologist, the appointment to take place March 1. Mr. Smith's work will have to do particularly with investigations of insecticides and the uses and limitations of commercial caseinate spreaders.

Dr. E. C. Van Dyke has been going to Monterey week ends during the past few months to advise the Del Monte Properties Company in regard to the control of a number of bark beetles which have been doing a great amount of injury to the Monterey pines on their extensive holding comprising over a thousand acres.

According to *Science*, Professor Warren T. Clark, professor of agricultural extension work, University of California, has been invited as a guest of the Pacific Mail Steamship Company to study the control of ants on shipboard. He sailed on December 12, on the Columbia which makes Mexican and Central American ports, passing through the Canal and proceeding by way of Havana to Baltimore.

The next regular meeting of the Pacific Slope Branch will be held in connection with the meeting of the Pacific Division of the American Association for the Advancement of Science and affiliated societies at Salt Lake City, June 22-24, 1922. A summer meeting of the A.A.A.S. is also to be called at Salt Lake City at the same time, and we of the Pacific Slope Branch are very anxious for our parent Association to meet with us at that time. E. O. Essig, Secretary.

Horticultural Inspection Notes

The Sorrel Cutworm, *Acronycta rumicis* L., was recently intercepted on fruit seedlings from France by Mr. T. T. Haack of Pennsylvania.

An amendment to the Minnesota quarantine on account of the European corn borer, effective February 25, 1922, includes the States of Pennsylvania, Ohio and Michigan and the Province of Ontario.

Since the first of the year, ninety-one nests of the White Tree Pierid, *Aporia crataegi* L., have been intercepted by State and Federal inspectors on fruit and rose stocks arriving from France.

Thus far, only two nests of the Brown-Tail Moth, *Euproctis chrysorrhoea* L., have been reported this season on fruit stock from France. One was found by State Inspector Dodge of New York on pear, and the other by Messrs. Zappe and Sealy of Connecticut, on Apple.

Apple stock from France is showing a relatively heavy infection with Hairy Root, which has been reported by a number of state inspectors. Recently Professor G. M. Bentley of Tennessee reported the finding of 7,210 infected plants in two shipments of French apple stock, consisting of 148,000 plants.

At the request of the President of the Association of Nurserymen, the conference on plant quarantines originally called to meet in Washington on March 15, and postponed at the request of the Society of American Florists and Horticulturists to April 19, has again been postponed until May 15.

The Annual Letter of Information, published by the Federal Horticultural Board which lists the pests collected on imported plants and plant products from January 1 to December 31, 1921, inclusive, has been compiled and will shortly be released in printed form. Copies of this letter will be available for distribution to all inspectors engaged in the examination of foreign plant material.

Mr. Emile Kostal, an inspector of the Federal Horticultural Board, located in New York City, recently discovered living larvae of the Pink Bollworm in cotton seed which was mixed with cotton lint used as packing around souvenirs from St. Kitts. This interception emphasizes the possibility of introducing the Pink Bollworm in cotton and cotton waste used as packing for glass, china, or other articles.

Mr. Ivan Shiller, who has recently completed postgraduate work at the Texas Agricultural and Mechanical College, College Station, Texas, was appointed Plant Quarantine Inspector with assignment at Del Rio, Texas. Mr. Robert A. Rodgers, formerly of the Forest Service, was recently transferred to the Federal Horticultural Board and located at Nogales, Arizona. Both of these men are assigned to the Plant Quarantine Inspection Service.

An attempt to smuggle into the United States, Mexican oranges in violation of Quarantine No. 5 (Mexican Fruit Fly) promulgated August 30, 1912, was recently thwarted by Federal Inspector Vernon J. Shiner, who discovered a number concealed under the rear seat of an automobile arriving at Laredo, Texas. Mr. H. H. Willis, who is in charge of the work of the Plant Quarantine Inspection Service at El Paso, reports that an attempt was made by two Mexicans early in January to smuggle a quantity of sugar cane into the United States from Juarez in violation of Quarantine No. 15, issued June 6, 1914. Steps have been taken to prosecute in both instances, the offenders at El Paso being jailed on account of inability to pay bail.